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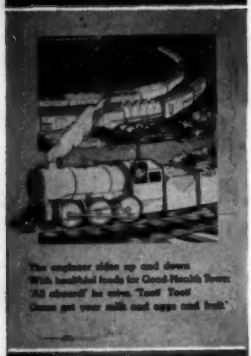

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HEART DISEASE: PROPHYLACTIC AND THERAPEUTIC MANAGEMENT OF THE PATIENT IN DENTAL PRACTICE

Malcolm Wallace Carr, D.D.S., New York

THE mortality statistics of the United States Bureau of the Census show that heart disease in its various forms stands first in the list of causes of death in the United States, is responsible for more than twice as many deaths as its nearest rival, cancer, and has shown a marked increase in frequency in persons past the age of 30 years. White[1] stated in part that heart disease, or perhaps more correctly termed "cardiovascular disease," has become the chief public health problem of our day. Ranking as the leading cause of death it has been widely but crudely publicized, and unwarranted fear of heart disease has swept the country.

Although it is true that the most recent and most accurate statistics do show a high incidence of cardiovascular deaths, there are certain considerations which tend to counterbalance the apparent seriousness of the present state of affairs: First, cardiovascular disease is not just one disease but actually a combination of a number of diseases, some quite unrelated except as they involve the heart or blood vessels. Thus heart disease is very different from tuberculosis, pneumonia or even cancer. Secondly, although the increase in heart disease occurs in older persons, there actually has been a decrease recently in the mortality rate of heart disease among persons less than 25 years of age.

These facts emphasize, nevertheless, the importance and magnitude of the problem and suggest the high incidence in dental practice of the patient with heart disease and, accordingly, the attendant responsibility of the dental profession to be informed as to the fundamental nature of the disease, its clinical varieties and symptomatology and certain principles of therapeutic management of the patient.

History and Examination

The diagnosis and treatment of heart disease, as of any other disease, are de-

The author expresses appreciation to Milton J. Raisbeck, New York, cardiologist, for many helpful suggestions in the preparation of this manuscript.

1. White, P. D., *Heart Disease*. New York: Macmillan Company, 1944.

pendent on the history and examination of the patient. The dentist should develop the capacity to recognize certain significant and obvious symptoms and signs, to analyze and correctly interpret other symptoms and signs elicited by physical examination performed by the physician and, not the least important of all, to appraise quickly the physical state of the patient. Attention to these considerations will develop clinical judgment and also knowledge of procedure and treatment and will yield the most satisfactory results in the management of the patient.

The most important fundamental principle of diagnosis is the history of the patient, the patient's own personal story of past medical illness or of recent subjective symptoms. A carefully developed history reveals not only direct information often of great diagnostic value but also knowledge of the type of person recounting the history, his personality and reactions as he tells his story. It also has the advantage that it almost invariably secures the sympathetic cooperation of the patient.

In cases of suspected heart disease the patient's history had best begin with a detailed account of present illness or of recent cardiac symptoms. It is essential to remember, however, that significant clues or guides to diagnosis may rest in the past history of illnesses, operations or accidents and especially in the treatment, diagnosis or opinion of the patient's physician. The patient's social and occupational history, his habits and the family history also may be sources of important information.[1]

The personal story of symptoms referable to the heart is the foundation stone on which examination of the cardiac patient rests. One sentence accurately and adequately presenting this information may be more valuable than all other data put together, and conversely an error or vagueness at the beginning may be seriously misleading. It is important to remember also that cardiac symptoms may be confused with noncardiac symptoms and that symptoms do not necessarily indicate disease; they may indicate temporary disturbance of function, whether or not dependent on structural disease.

Analysis of Symptoms and Signs

The three most important symptoms of cardiovascular origin are pain, respiratory disorders and palpitation.

Pain.—Thoracic and referred pain, for which the heart or great vessels are responsible, may be an important symptom of cardiovascular disease, but it also must be realized that pain in the chest may not be caused by heart disease. Chest pain is significant if it is produced by effort and may be so severe that the patient is stopped while walking. These pains occur during effort out-of-doors and rarely indoors. Such pains are always serious, but others which come and go at rest are usually not important.

The pain may be characterized by precordial aching or short, sharp stabs of pain or by the more serious symptom of substernal oppression caused by coronary insufficiency. Such substernal oppression may be either transient as in the case of paroxysmal angina pectoris or it may last for hours as in the case of acute coronary occlusion with myocardial infarction.

Respiratory Disorders.—Dyspnea (difficult breathing or breathlessness) is the most important of the fundamental disorders of respiration related to heart disease. Dyspnea, however, is not pathognomonic of heart disease; it has many other causes. The dyspnea produced by heart disease is the end result of a reflex action on the respiratory center from engorgement of the pulmonary circulation.

The primary cause of dyspnea is weakness of the left ventricle, which pumps blood away from the lungs. Therefore, if the blood is not pumped away it remains in the pulmonary vessels (which

are overfull), and thus there is a stiffening which prevents the pulmonary alveoli from expanding properly, as well as a reduction of space in the chest cavity. Reflex disturbances result from overfull vessels in the lung.

A simple way to determine whether dyspnea has developed with effort is to ask the patient whether he becomes breathless from any activity which formerly did not cause breathlessness.

Palpitation.—Perceptible pulsation of the heart, or palpitation, is a less important heart symptom than pain or dyspnea. It consists of an unpleasant sensation of the rate or rhythm of heart action, which may be either slow or fast, regular or irregular. Palpitation may be the manifestation of relatively unimportant disturbances of heart rhythm, namely, premature beats, extrasystoles or paroxysmal tachycardia, and may result from effort or excitement, toxic effects (as from tobacco and alcohol) or infection. Palpitation which may be of importance, however, is consciousness of heavy beating of the heart after meals and especially after effort. Any circulatory symptom provoked by effort is likely to be significant, a sign of some real cardiac problem.

Other Symptoms.—There are other symptoms that are frequently, occasionally or rarely associated with heart disease. Exhaustion, nervousness, insomnia, dizziness, headache, cough, faintness and syncope are usually incidental to various complications of heart disease. Cyanosis and edema are symptoms of more important complications.

Cyanosis or dark blue color of the skin and mucous membranes, when marked or constant, may be an important symptom of serious disease of the heart, blood vessels or lungs. Cyanosis is the outstanding symptom in congenital heart disease but usually does not otherwise appear unless breathlessness is marked. This change in color is the result of the presence, in dilated superficial blood vessels, of venous blood in which a high percentage of the hemoglobin has lost its oxygen. This phenomenon may be caused by a slowing of peripheral circulation by vasomotor changes, obstruction to the return of blood to the heart or pulmonary congestion due to heart disease.

Edema or swelling is the evident accumulation of excessive fluid in the body tissues and may result from congestive heart failure or cardiac decompensation. This is usually an important symptom. Although edema may occur in any part of the body, it is most common in dependent portions, such as the lower extremities, especially the ankles, and at the bases of the lungs. Obstruction of the venous circulation (the return of blood to the heart) is frequently responsible for edema and may be caused by venous thrombosis due to inflammation or stasis, or the inability of the right ventricle (from failure) to pass on all the blood it receives. A way to find out about edema of the ankles is to ask the patient whether he notices that his shoes get tight toward the end of the day or whether there is any puffiness of the ankles toward evening.

The general dentist has unusual opportunity, owing to regular and recurrent visits of his patients, to observe signs and symptoms of heart disease, and by simple interrogation of his patient (whose confidence he already enjoys) additional data readily may be secured and become an important part of the patient's history. Thus, by trained observation, later confirmed by the history and the presence of subjective symptoms, the dentist may be the first to recognize the signs and symptoms of developing heart disease and be responsible for referring the patient for competent medical consultation. The final diagnosis, obviously made by the cardiologist, depends on physical examination with utilization of the methods of inspection, palpation, percussion and auscultation of the heart, sphygmomanometry, cardiovascu-

lar roentgenography, electrocardiography and other methods of examination by various laboratory tests.

Etiologic Types

Heart disease, expressed in simplest terms and in accord with the most recent trend in cardiac diagnosis, is classified, perhaps foremost, into etiologic types. The most common and serious types of heart disease, thus classified, are rheumatic heart disease and bacterial endocarditis, both infectious in origin, and disease caused by degenerative changes, hypertensive heart disease (either with or without arteriosclerosis) and coronary heart disease. Other etiologic types are recognized and include congenital cardiovascular defects and cardiovascular syphilis.

In addition to the etiologic types of heart disease, a complete diagnosis includes also a consideration of the pathologic structural changes present in the heart and great vessels and the disorders of function.

Rheumatic Heart Disease.—This is a disease of youth and young adult life. Severe rheumatic infection in early youth always involves the heart, but many patients who have rheumatic infection with heart damage give only a history of rheumatoid pains without any frank, acute illness in the past. The cause of the infection in the heart is not yet completely determined, but the general consensus is that the Streptococcus hemolyticus is perhaps the chief of several exciting factors which precipitate the so-called rheumatic state throughout the body, particularly in the heart.[1] The portal of entry of the infection into the body is also undetermined, although the faucial tonsils have been considered the chief portal. Other lymphoid tissue in the pharynx and nose and pulpless and infected teeth also may harbor the infectious organisms (or virus), and there is the possibility that foci of infection may exist in the accessory sinuses, middle ear and gastrointestinal tract.

Rheumatic infection is responsible for heart valve lesions (endocarditis) and heart muscle damage (myocarditis). The combination of the mechanical handicap of deficient valve action and the impaired pumping action of the weakened heart muscle (lack of muscle power or muscle reserve) leads to left ventricular failure (congestive heart failure). High blood pressure (hypertension) also causes a strain on the left ventricle but does not lead to heart failure unless there is damage to the heart muscle. Congestive heart failure is attended by symptoms of respiratory disorders — dyspnea (breathlessness) and pronounced palpitation (pounding of the heart on effort). There also may be edema and digestive disturbances caused by chronic passive congestion of the liver and other viscera.

Bacterial Endocarditis.—This is a term which designates an active bacterial involvement of the valves of the heart. The organisms which may be responsible for this serious condition include the Streptococcus viridans, Streptococcus hemolyticus, the pneumococci, staphylococci, gonococci and influenza bacilli.[2] Subacute and acute forms are recognized. The disease usually is attended by bacteriemia. The mortality rate previously was exceedingly high, but penicillin now is responsible for many cures.

Hypertensive Heart Disease.—Hypertensive and coronary heart disease are degenerative diseases of middle life and advanced age. Hypertensive heart disease usually is accompanied by arteriosclerosis, and the high blood pressure leads to left ventricular fatigue (later congestive failure) and also to involvement of the coronary arteries.

Coronary Heart Disease.—This is the general term used to designate the various effects of coronary arterial disease on the

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2. Comroe, B. I.; Collins, L. H., and Crane, M. P., *Internal Medicine in Dental Practice*. Philadelphia: Lea and Febiger, 1949.

heart, chiefly the heart muscle. The designations "coronary insufficiency," "coronary occlusion" and "coronary thrombosis" denote the gradual or sudden occlusion of one or more of the coronary arteries (the nutrient vessels of the heart muscle), usually as the result of the degeneration of the connective tissue of the arterial wall—an atheromatous process called atherosclerosis. This condition usually is attended by the symptoms of angina pectoris and often leads to myocardial infarction, areas of necrosis in the heart muscle as a result of loss of blood supply. The term "angina pectoris" is applied to the occurrence of sudden attacks of pain, especially on effort. The pain is located centrally in the chest—precordial pain—and often extends down the left arm. Anginal pain is due to a diminished and insufficient oxygen supply to a portion or all of the heart muscle resulting from a defective blood supply and caused by the narrowing (atherosclerosis) or temporary spasm of the coronary arteries.[1]

Principles Related to Dentistry

Whereas, the recent introduction of new procedures in general surgery for patients with certain cardiovascular diseases has given ample opportunity to confirm the experience that these patients tolerate surgical operations well,[2] it is necessary, nevertheless, to evaluate the physical state of the patient, or surgical risk, to be observant of cardinal symptoms and signs of heart disease, and at all times to exercise conservative judgment and precaution whenever any operative procedure is planned for the cardiac patient, regardless of how minor the procedure may be.

Consultation and cooperation with the physician, or preferably the cardiologist, is a fundamental principle recommended in every case of suspected or known heart disease. This procedure not only gives the patient the advantage of skilled diagnosis by a specialist but also divides the responsibility of the care and management of the patient, particularly when consideration is given to the advisability of removing pulpless and infected teeth and the choice of anesthetics.

In all operations of choice, which include all general dentistry and the majority of oral surgical procedures, the operative or surgical procedure should be limited to what the cardiac patient can easily tolerate, in order to avoid serious exacerbation of symptoms of heart disease. If the cardiologist and the dentist have decided on the advisability of removing several or many pulpless and infected teeth, conservative judgment dictates that the procedure should be divided into stage operations in order to reduce to a minimum the incidence of unfavorable sequelae.

Local anesthesia is preferable for patients with heart disease. Procaine hydrochloride (U.S.P.) usually is considered the most favorable agent for the production of local anesthesia. The reduction or elimination of vasoconstrictor agents commonly added to local anesthetic solutions is desirable. These agents are dangerous, particularly for patients with anginal pain or hypertension. For normal patients without these conditions the admixture of a small amount of a vasoconstrictor agent in local anesthetic solutions employed in dentistry probably would not cause any untoward cardiovascular complication.

If there is no alternative, because of acute infection or other complicating factors, and general anesthesia is chosen, consultation with the cardiologist and anesthetist is recommended, in order to determine the anesthetic agent and method of administration best suited to the individual patient. Consideration must be given at all times to all factors that favor reduction of hazards and increase of safety. Adherence to this prin-

2. Scherf, David. Evaluation of Cardiac Patients for Surgery. *N. Y. State J. Med.* 46:1915 (September 1) 1946.

ciple suggests the advantage of hospitalization. In the hospital the patient has the benefit of all known devices for safe management, not the least of which are preoperative medication (when indicated), the important consideration of operation in a recumbent posture and postoperative rest in bed.

An inhalation method of administration of a volatile agent, preferably ether, which when skillfully administered is a respiratory and circulatory stimulant, should receive favorable consideration. Excitement and struggling should be avoided during induction. Free respiratory ventilation is essential throughout the operation, and anoxia must be prevented at all times by adequate administration of oxygen. The presence of anoxemia with production of cyanosis is dangerous. Depressing anesthetic agents should be avoided.

Nitrous-oxide-oxygen administered as the principal and continuous anesthetic agent is contraindicated in patients with confirmed heart disease.

Rheumatic Heart Disease. — Research has shown and clinical investigation has confirmed that oral sepsis (periodontal and periapical infection) may constitute primary focal infection which by metastasis may be the etiologic or aggravating factor directly responsible for secondary lesions elsewhere in the body. The evidence that chronic local infection can be responsible for damage in remote tissues of the body (the evidence for the concept of focal infection) is summarized, in part, by Appleton,[4] as follows:

(1) The same bacteria notably Streptococci which are found at the focus have in some instances, been recovered from remote lesions. (2) The bacteria isolated from the focus when injected into susceptible animals will sometimes bring about a condition in the animals similar to that seen in the patient. (3) The elimination of infection at the primary focus is in some instances followed by amelioration or cure of the "secondary" condition. However, the failure of improvement in such a circumstance does not definitively weigh against the doctrine of focal infection. If bacteria have successfully colonized at the site of the "secondary" lesion, e. g., in the heart valve, their removal from the primary portal may prove unavailing.

Clinical experience indicates that every pulpless tooth and certainly a pulpless tooth with evidence or a history of periapical infection must be regarded with serious suspicion, particularly when search is being made to determine the portal of entry of infection in cases of infectious or degenerative constitutional disease. Evidence of periapical chronic rarefying osteitis, as shown in the roentgenogram, is usually an end product—the result of pre-existing or concurrent active infection. Therefore, pulpless teeth should not be retained by patients who have the types of heart disease (valve lesions and congenital lesions) in which bacterial endocarditis is most likely to develop. The certainty of total and permanent eradication of periapical infection is doubtful or at least problematical without removal of the infected teeth.

Focal infections are considered among the etiologic and aggravating factors in rheumatic heart disease, and the portal of entry of the infection may be by way of primary dental foci. Although there is no way of determining with certainty whether the primary focus is related to the secondary lesion or whether the primary focus may be followed by metastases, these areas of potential (if not active) infections must be given serious consideration. In infectious heart disease (rheumatic heart disease) the role of infection elsewhere in the body is of extreme importance, and it may occasionally be so in degenerative lesions in the heart muscle. Elevation of body temperature (even slightly above normal) and variation from normal of the blood count and sedimentation rate are the most sensitive indexes which tend to confirm the presence of active infection.

4. Appleton, J. L. T., *Bacterial Infection*. Philadelphia: Lea and Febiger, 1925.

Whereas, it is true that anesthesia and operation may be well tolerated by patients with a compensated rheumatic valvular lesion and also by patients with compensated hypertension, there is always the risk of exacerbation from removal of infected teeth. The operative risk is increased considerably with coronary sclerosis and particularly with coronary occlusion and with a decompensated heart.

Exercise tolerance may be considered the criterion of risk. A patient without acute symptoms of heart disease who can climb a flight of stairs without respiratory effort or discomfort is probably a fairly good risk. Even in spite of an old valve lesion the heart is probably mechanically competent if the patient can tolerate exercise. If, however, there are symptoms of dyspnea, marked palpitation, cyanosis or edema of the ankles the patient should be examined by the cardiologist before any operative procedure is initiated.

In the presence of any type of heart disease considerable judgment must be exercised before deciding to remove infected teeth and thereby run the risk of liberating bacteria, or their toxins, and thus precipitate a bacteriemia or a septicemia. It is possible to demonstrate positive blood cultures in a certain percentage of cases within a few minutes following the removal of an infected tooth. There may be an optimum time to perform operation, and it is probable that certain preoperative medication may be of considerable importance in the avoidance of serious or even fatal exacerbations.

The patient with evidence of decompensation or a too rapid ventricular rate may require strophanthin or digitalis, and the neuropsychotic patient probably should receive adequate sedation, preferably pentobarbital sodium, before operation. Chemotherapy and the antibiotics now play an important prophylactic role in preoperative medication, particularly in cases of rheumatic heart disease, and may prevent a bacterial endocarditis which otherwise might be precipitated by a bacteriemia following removal of infected teeth.

Sulfadiazine is the sulfonamide of choice and should be administered for three or four days before operation and continued for three or four days after operation. When sulfa drugs are administered, sodium bicarbonate also should be prescribed, a teaspoonful twice a day between meals (10 a.m. and 4 p.m.), so that it will be absorbed as an alkali without disturbing digestion. The patient also should drink plenty of water, enough so that a quart and a half of urine (1,500 cc.) is passed every twenty-four hours. If the drug is continued for a longer period than that previously mentioned, the blood level should be established, and it is important to repeat blood count and urinalysis studies at intervals during the period of administration of the drug. Postoperative rest, preferably in bed, also is recommended.

Penicillin is an important antibiotic agent, and it should be considered favorably as a preventive of transient bacteriemias following extraction of infected teeth and to reduce the incidence of other untoward sequelae due to rapid metastasis.

Acute and Subacute Bacterial Endocarditis.—This is such a serious disease, characterized in the past by a high mortality rate, that the advisability of surgical intervention for the eradication of focal infections may be doubtful. A patient with a bacterial valve lesion should not have a focus of infection opened surgically (tooth removal) without preoperative chemotherapy.

Hypertensive Heart Disease.—Hypertensive heart disease (high blood pressure) and arteriosclerosis are conditions in which it is especially important to avoid the use of a vasoconstrictor drug in the local anesthetic solution, and if a general anesthetic agent is administered anoxia

must be avoided. Preoperative and postoperative sedation and rest also are recommended.

Coronary Heart Disease.—The symptoms of thoracic or precordial pain, either with or without radiation, may be a sign of coronary disease. Coronary thrombosis is imminent when attacks of anginal pain occur with increasing frequency or even while at rest.[3] Patients with coronary disease vary considerably as to pathologic involvement, as well as to tolerance for surgical procedures, and hence they must be evaluated individually. In the presence of coronary disease, operations of choice should be avoided, and patients who have a history of coronary occlusion and myocardial infarction should not have operations of choice performed within a period of three months of the last attack, and even then the risk may be too great. Vasoconstrictor drugs should not be used for patients with anginal pain and coronary disease. The use of these drugs causes greater demand on the heart muscle for oxygen, owing to increased motility of the heart, higher heart rate and increased blood pressure, and may precipitate severe and serious disturbance in patients with coronary stenosis.

Treatment of Acute Exacerbations

A selection of appropriate drugs should be prepared and readily available for emergency use in every dental office. Ampules containing drugs for hypodermic injection and a sterile hypodermic syringe should be kept in a sterile sealed container. Recent advances in pneumatology indicate also effective results from inhalation therapy in cases of respiratory or circulatory disorders. A tank of oxygen-carbon dioxide (oxygen 90 per cent and carbon dioxide 10 per cent), with appropriate apparatus for its administration, should be included in all emergency armamentaria.

Syncope.—This is the most common circulatory disturbance experienced in dental practice. In most instances its cause is a psychosomatic phenomenon of vasomotor origin, and its symptoms are due to a transient cerebral ischemia. Pallor develops, the skin becomes cold and moist, the pulse may be weak at first and later become rapid, and the patient may experience a transient unconsciousness. The patient should be placed in a supine posture with the head lower than the body, or if he is sitting, the body should be bent sharply forward and the head forced to a position between the knees. Inhalation of ammonia or amyl nitrite is usually all that is necessary to restore the patient. A convenient method of administration is a capsule enclosed in a silken sac which may be broken between the fingers and the vapor inhaled. Inhalation of oxygen-carbon dioxide also may be indicated. When the patient has recovered sufficiently, administration of aromatic spirits of ammonia by mouth is also an effective remedy. One of the characteristics of syncope is the rapid recovery of the patient. In cases of habitual fainting, the patient should be placed in a supine posture in the dental chair as a preventive measure.

Shock and Circulatory Collapse.—These are more serious conditions than syncope and require prompt and effective treatment. The initial symptoms are similar to syncope, but the adverse circulatory reaction is more severe, and recovery does not take place so rapidly. There is extreme pallor or ashen-gray color of the skin which becomes cold and moist. The patient lapses into unconsciousness with dilation of the pupils, which react only sluggishly to light. The pulse is weak, thready and rapid, and the blood pressure falls. There may be a tendency to partial recovery and relapse. The patient should be placed in a supine posture, and provision should be made for establishing an adequate airway and administration of oxygen-carbon dioxide. Artificial respiration may be necessary.

Hypodermic injection of caffeine-sodium benzoate is effective and safe and is the best treatment for this type of shock.

The best drug for sudden collapse, if there is no coronary disease and no hypertension, is epinephrine, ½ cc. of 1/1,000 solution and a second ½ cc. if needed. However, one must be sure that coronary disease and high blood pressure are absent.

A vasovagus attack may be characterized by slow, weak pulse and general collapse: Atropine grain 1/100 is effective for this condition and is also safe for anyone.

Dyspnea.—Dyspnea, or severe breathlessness, may develop rapidly and may be a serious symptom of left ventricular failure or pulmonary edema. Dyspnea (when severe or prolonged) leads to apnea due to overventilation and may result in asphyxia. Inhalation therapy of oxygen-carbon dioxide is the most effective physiologic form of treatment. Sudden breathlessness with moisture in the lungs (pulmonary edema) may be controlled promptly by a hypodermic injection of morphine sulfate.

Angina pectoris or severe precordial and thoracic pain may be a symptom of acute coronary disease. Nitroglycerin may be used to relieve this symptom, and inhalation therapy of oxygen-carbon dioxide may be indicated. Morphine sulfate is the sheet anchor for severe anginal pain. It should not be used if there is much cyanosis or bronchial asthma but for the gray, sweating coronary patient with chest pain, morphine is needed promptly.

Conclusions

Recent advances in science, especially in the fields of bacteriology, pathology and roentgenology, have extended enormously the biologic importance of dentistry and have had a signal influence in the development of the favorable relation between medicine and dentistry and their intimate mutual responsibility as servants of the public health. It is, however, fundamentally important that each profession understand the problems of the other in order that the patient may receive the full measure of benefit offered by modern science. This is manifestly axiomatic in the prophylactic and therapeutic management of the patient with heart disease in dental practice.

The reward of the practice of dentistry and medicine lies not only in service to others and in the satisfaction derived from intellectual interchange of thought, but also in the realization that both professions are still but pioneers and in the hope that by cooperation and concentrated effort the development of improved procedures and useful discoveries may be even more effective in relieving human suffering and extending useful lives.—*52 East Sixty-First Street.*

Books and Our Civilization.—Civilized man cannot live without books. For all that is worth knowing must be learned anew by each generation in its turn. And our civilization is too complex to be handed down by word of mouth or maintained by memory alone.

You and I, therefore, to be civilized and to civilize our children, must buy and give books as well as read them. . . .

Books may be classified as toys, tools, or treasures. Some amuse us or fill an idle hour; others arm us for the work and worry of life, giving us practical aid; still others last a lifetime, books to which we return again and again for the comfort, inspiration or stimulation they afford, books that marshal us the way that we are going. We read for fun, for help, or for the more abundant life.—*Stanley Vestal, in the Chicago Sunday Tribune, December 7, 1947.*

CARCINOMA OF THE LIP: PRELIMINARY STATISTICAL ANALYSIS OF EIGHT HUNDRED TWENTY-SEVEN CASES

Joseph L. Bernier, D.D.S., M.S., Washington, D. C.

SQUAMOUS cell carcinoma of the lip is of particular importance to the dentist because of its frequency of occurrence and because accurate clinical diagnosis is so essential in a condition with such a serious prognosis.

This survey is based on material from the files of the Registry of Dental and Oral Pathology of the American Dental Association. All of the tumors occurred in members of the Army. Examination of the case records of more than 2,500 lesions resulted in acceptance of only 827 cases in which the clinical record was sufficiently complete to warrant statistical study. It is on the latter group of cases that this study is based. It must be emphasized that this is a preliminary investigation and that the completed work will include additional material together with morphologic analysis and detailed follow-up data.

Clinical Consideration

In considering the clinical characteristics of the squamous cell carcinoma it is well to remember that many varieties are encountered and that any of these may be complicated by secondary infection and trauma. Likewise, it is sometimes impossible clinically to distinguish carcinoma of the lip from leukoplakic lesions which are so often the precursor of cancer. In this survey are included only those cases in which the clinical diagnosis was corroborated by microscopic analysis.

Ewing[1] distinguished two main types of carcinoma of the lip, a classification later accepted by Quick[2] and Martin[3] and now generally regarded as a satisfactory method of clinical division. These two varieties are the papillary type and the ulcerating or infiltrating type. There are many transitional forms between these two extremes, so that accurate classification is often academic. In general, however, reports with regard to large numbers of lip carcinomas, such as that published by Ebenius,[4] indicate that these two forms occur most frequently. Ebenius described with accuracy the geographic location of carcinomas of the lip and stated that no lesions other than those arising in the "red of the lip" should be regarded as genuine. In his opinion, the red of the lip is the area between the cutaneous portion of the lips and their line of closure. More specifically, this area is bounded anteriorly by the borderline between the transitional and cutaneous portion of the lips and posteriorly by the line along which the lips meet (Fig. 1). This criterion was used in the selection of the cases in this report. Such a clear-cut definition of location is essen-

Lieutenant Colonel (DC) U.S.A., and secretary and pathologist of the Registry of Dental and Oral Pathology of the American Dental Association, Army Institute of Pathology.

Read at the annual meeting of the Wisconsin State Dental Society, Milwaukee, April 1, 1947.

1. Ewing, J., *Neoplastic Diseases*. Philadelphia: W. B. Saunders Co., 1940.

2. Quick, D., Radium in the Treatment of Epithelioma of the Lip. *J. Radiol.* 2:1 (December) 1921.

3. Martin, H. E., Treatment of Cancer of the Lip. *Am. J. Surg.* 30:215 (November) 1935.

4. Ebenius, Bertil, Cancer of the Lip, *Acta radiol. Supp.* 48:1, 1943.

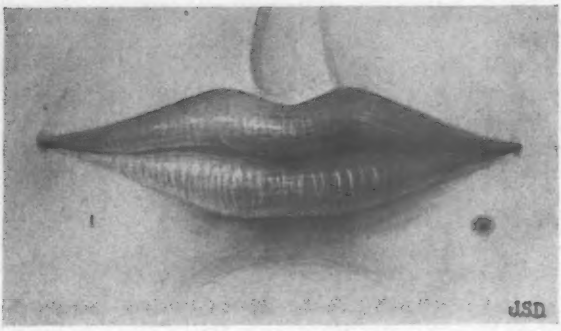

Fig. 1.—The red zone

tial because lip carcinoma in some classifications includes basal cell as well as squamous cell carcinoma; squamous cell carcinoma alone is considered in this series.

The papillomatous type, which at the Army Institute of Pathology is designated the verrucous form, in its early stages gives the appearance of thickening of the epithelium with a slight elevation above the surrounding edges (Fig. 2, A). Initially the papillary projections are so low that the lesion appears merely as a roughened surface, but with time the projections increase in height and become much more prominent (Fig. 2, B and C). Many of these tumors remain superficially located with their bases immediately below the epithelium, even though they may spread laterally. The

Fig. 2.—The papillary form of lip carcinoma in its transitional stages: A, the initial raised thickening; B, the shallow papillary projections; C, terminal and excessive keratin production, and D, later phase of ulceration

Fig. 3.—The infiltrating form of lip carcinoma in its transitional stages (see also Figure 4): Left: Early shallow excoriation. Right: Lateral and deep extension

superficial parts may become necrotic and break down, first at the center and then at the periphery, resulting in loss of the papillomatous character and ulcer formation (Fig. 2, D). This ulcer may crust over, producing a shallow excoriation.

The second type, the ulcerating or infiltrating variety, also begins as an initial thickening of the epithelium, elevation being absent (Fig. 3). The surface soon becomes somewhat scaly and, in this intermediate stage, is elevated slightly above the adjacent tissue (Fig. 4, left). Ulceration appears earlier than in the verrucous form; indeed, in a high percentage of cases it is present from the beginning. The ulcer varies considerably in depth and is generally round or oval, often with jagged edges (Fig. 4, right). In extremely old lesions necrosis may produce large defects. Secondary infection, although more common in the ulcerative form, is encountered in both forms, greatly altering the clinical picture.

Certain authors have suggested that both types could be further subdivided into superficial and deeply infiltrating tumors. This division, which is based on the degree of infiltration, is not too accurate. The superficial lesions in their early stages are often disk-shaped because they extend along the surface of the lip, not penetrating more than a few millimeters. Not until late in their course can they be classified as deeply infiltrating. Then they grow in all directions simultaneously and, therefore, assume spherical or oval forms. They lie, for the most part, under the level of the epithelium and may extend only secondarily above the surface.

Statistical Consideration

Age Distribution.—The age distribution varies considerably depending on the type of material analyzed. In this group of 827

Fig. 4.—The infiltrating form of lip carcinoma in its transitional stages (contd.): Left: Oval, flattened configuration with scaly surface. Right: Terminal ulceration

lesions the highest percentage occurred between the ages of 30 and 39, 267 (36.1 per cent) being so reported. In a survey of 375 lesions, Martin[3] reported that 98 per cent occurred between the ages of 50 and 70 years. Bergendal[5] in an analysis of 265 cases reported that 91.3 per cent occurred between the ages of 60 and 70 years. Their figures are in agreement with other published reports of significant groups and are at marked variance with age distributions in this series. This can be explained by the character of the material examined inasmuch as that in this study comes from young men of military age, whereas that reported by other authors came from people of all ages and walks of life (Table 1 and Fig. 5).

Sex Distribution.—From this analysis no estimation of sex incidence in the population could be made since all the patients were men. Other statistical surveys, however, indicate a much higher incidence of lip carcinomas in men. Sixteen different series reported between the years 1865 to 1941 have been analyzed. In all there were 3,536 tumors, with an average of 93.3 per cent in men and 6.7 per cent in women, roughly a ratio of 14 to 1. This is in keeping with the compiled statistics of Lane-Claypon[6] who analyzed statistics published previous to 1930. Statements as to the sex distribution of cancer of the upper and lower lips indicate that about 93.9 per cent of those on the lower lip occur in men as compared with 6.1 per cent in the same location in women. The corresponding percentages for the upper lip are 63.8 and 36.2, respectively. These figures are only approximate, but even allowing for some margin of error, it is clear that there is a marked variation in the relative

5. Bergendal, A., A Review of 10 Years' Radium Treatment of Lip Cancer at the Radiological Clinic, Lund, Sweden. *Acta radiol.* 19:103, 1938.

6. Lane-Claypon, Janet E., *Report on Cancer of the Lip, Tongue and Skin.* Ministry of Health, Reports on Public Health and Medical Subjects, No. 59. London: His Majesty's Stationery Office, 1930.

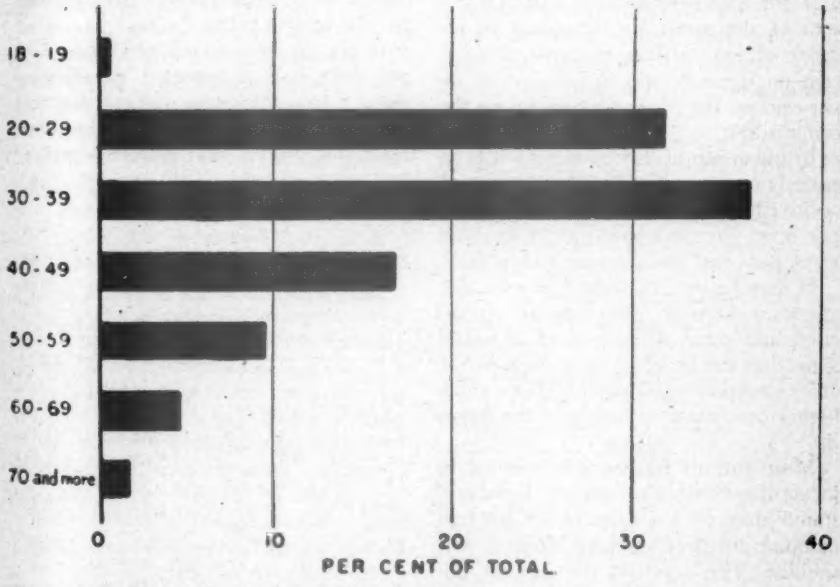

Fig. 5.—Age distribution of 740 patients with carcinoma of the lip. Age was not stated in 87 cases in the series

Table 1.—Age distribution of patients with carcinoma of the lip

Age group	Number	Per cent of total
18–19	5	0.7
20–29	233	31.5
30–39	267	36.1
40–49	123	16.6
50–59	67	9.1
60–69	33	4.5
70 and more	12	1.5
Unknown	87	—
Total	827	100.0

frequency in men and women of lesions of the lower lip as compared with those of the upper lip.

Location.—The figures regarding the location of these lesions are of considerable interest. In all statistical studies there is a predominance of carcinoma of the lower lip. Lane-Claypon[6] assembled reports from twenty different series comprising 3,763 cases and calculated the proportion of tumors of the lower lip as 94.2 per cent as compared with 5.8 per cent of the upper lip. Ebenius,[4] in his group of 792 patients, reported 98.0 per cent on the lower lip in contrast to 1.0 per cent on the upper lip and 1.0 on the commissure.

In my group of 827 cases, which is an entirely male group, 662 (80.1 per cent) occurred on the lower lip and 78 (9.4 per cent) on the upper lip. In 87 cases (10.5 per cent) the site was not specified.

It may be seen that there is some discrepancy between the various reports cited and these findings, and it would seem that the inclusion of women in the other statistical reports resulted in a much higher percentage of lesions of the upper lip.

Most authors have not attempted to locate these lesions accurately. Kreyberg[7] stated that 95 per cent of all lip carcinomas involved regions close to the midline. This was not the case in this series. Of those occurring on the lower lip, 117 were on the right side, 118 on the left side and 51 in the center. In 376 cases the exact site was not indicated. Of those in the upper lip, 19 occurred on each side and 3 in the center, 37 not being located. From these figures it would appear that the lesions occur on the right and left side with about equal frequency, although in general, tumors in the center of the lips occur less often.

Duration.—Inasmuch as data as to duration are based on the questionable recollection of the patient, they cannot be given too much emphasis. In this series of cases, 182 (26.2 per cent) had a reported duration of from 1 to 3 months. One-hundred and sixty-two (23.3 per cent) had been present from 4 to 6 months and 101 (14.5 per cent) between 7 and 9 months. Therefore, a total of 445 (64 per cent) had a reported duration of from 1 to 9 months prior to admission of the patient to the hospital (Table 2). In the remaining cases the lesion had been present for varying periods up to 5 years.

In the group reported by Ebenius,[4] 54 per cent had a reported duration of from 1 to 12 months and 31 per cent from 1 to 3 years, the remaining cases extending beyond that period. Nyström,[8]

Table 2.—Duration of lesion prior to initial hospital admission

Duration (months)	Number	Per cent
1–3	182	26.2
4–6	162	23.3
7–9	101	14.5
10–12	86	12.4
13–18	40	5.7
19–24	44	6.3
25–36	21	3.0
37–60	23	3.3
More than 60	37	5.3
Not stated	131	—
Total of known duration	696	100.0

7. Kreyberg, L., *Maligne svulster*. Oslo: Tanum, 1937.

8. Nyström, Gunnar, *Kräftsjukdomarne i Sverige*. Stockholm: Svenska Tryckeriaktiebolaget, 1922.

Table 3.—Largest dimension of tumor in 438 cases of carcinoma of the lip

Dimension (cm.)	Number	Per cent
0.1-0.3	65	14.8
0.4-0.6	119	27.2
0.7-0.9	90	20.5
1.0-1.2	92	21.0
1.3-1.5	39	8.9
1.6-2.0	20	4.6
More than 2.0	13	3.0
Not stated	389	—
Total	827	100.0

Average size 0.85 cm.

reporting on 245 cases, listed 67 per cent of less than a year's duration and Bergendal[3] reported 68.2 per cent of less than a year's duration.

In this respect my figures are in keeping with other reports. From this information it can be said that most lip carcinomas apparently have an average duration before treatment of less than a year.

Size.—Some interesting data are available on the size of carcinomas of the lip. In general, the dimensions are based on the greatest extension of growth. Of course, any consideration as to size is purely arbitrary, but it has some justification in that the clinical features tend to vary somewhat with increases in size. Ebenius[4] reported 299 (47.3 per cent) that measured 2 cm. or less and 166 (26.9 per cent) that measured from 2 to 4 cm. The size of the remaining lesions was in excess of these measurements.

In this series of 827 cases, size was not described in 389. Of those remaining, 65 lesions were from 0.1 to 0.3 cm., 119 were from 0.4 to 0.6 cm. and 182 were from 0.7 cm. to 1.2 cm. The remainder of the lesions were larger. In all a total of 425 (97 per cent) were less than 2 cm. in greatest diameter (Table 3).

There is a discrepancy between these figures and those of Ebenius,[4] which probably can be explained by the availability of medical care to members of the armed forces.

Primary Pathologic Diagnosis.—Although most reports do not include data as to the primary pathologic diagnosis, this information was obtainable because in a high percentage of my cases the tissue previously had been examined by a pathologist. Of the 827 cases in this report, 738 (91.9 per cent) had been diagnosed as squamous cell carcinoma; 57 (7.1 per cent) as basal cell carcinoma and 8 (1 per cent) as the baso-squamous type. In 24 cases, no diagnosis was submitted, resulting in a total of 65 (only 8.1 per cent) of the cases in this series in which there was any original question as to the primary diagnosis. These lesions later were verified as squamous cell carcinoma.

Initial Treatment.—Another unusual phase of this survey, again because of the fact that the patients previously had been examined and treated, is the tabulated record of the type of initial treatment. Seven hundred and twenty-seven (88.9 per cent) were treated by surgical operation alone; 31 (3.8 per cent) by irradiation alone, and 42 (5.1 per cent) by surgical operation and irradiation. It is apparent, therefore, that surgical operation is the treatment of choice among clinicians (Table 4).

Metastases and Recurrence.—Of considerable interest is the incidence of metastasis. In general, metastasis in cases of carcinoma of the lip occurs by way of the lymphatic vessels, the cervical and submental nodes usually being the first affected. It must be remembered that the spread of carcinoma may take place

Table 4.—Treatment of initial lesion in carcinoma of the lip

Treatment	Number	Per cent
Surgical alone	727	88.9
Radiation alone	31	3.8
Surgical and radiation	42	5.1
Other	18	2.2
Not stated	6	—
No treatment	3	—
Total with treatment	818	100.0

Table 5.—Recurrences and metastases in carcinoma of the lip

Recurrences or metastases	Number	Per cent of total cases
Recurrences	82	9.9
One	66	
Two	9	
Three	5	
Four	1	
Five	1	
Metastases*	29	3.5
Lymph node	26	
Bronchi	1	
Adrenal glands	1	
Liver, spleen and lungs	1	

*In 8 cases the metastases had occurred previous to hospitalization.

either by continuity or by embolism. In the former instance the tumor cell enters the lymph vessel and continues to multiply and spread until it reaches a lymph node. Here cells become separated and are carried by the lymph stream to a nearby lymph node, there infiltrating its substance. In the latter instance, cells detach themselves from the main tumor mass and are carried through the lymphatic vessels to adjacent lymph nodes. In this report, in 29 cases (3.5 per cent) there was metastasis, in 26 cases to the regional lymph nodes, in 1 to the peribronchial nodes, in 1 to the adrenal glands and in 1 to the liver, spleen and lungs. In 8 cases, metastasis had occurred prior to hospitalization (Table 5).

The frequency of recurrence of carcinoma of the lip is slight after surgical operation as well as after irradiation. Figi[9,10] reported that there were recurrences in 2.36 per cent of 553 surgically treated primary lip tumors, of which 263 had been followed at least 3 years. Martin[3] recorded 219 five year cures following irradiation in his series of 375 cases.

In my series 82 (9.9 per cent) of the carcinomas recurred: 66, once; 9, twice, and 5, three times. In only 2 cases were there more than three recurrences. This percentage is only slightly higher than that reported by other authors (Table 5).

Although the time interval between treatment and recurrence has not been tabulated in the group reported in this survey, Ebenius[4] reported that 53 per cent of all recurrences developed the first year after treatment and most of them during the first 8 months.

Predisposing Factors

Data regarding predisposing factors have not yet been compiled, but other published findings include many interesting remarks. Both endogenous and exogenous factors are of importance. Those of an endogenous nature have been discussed in the statistics being reported. External influences, however, are quite different, and much of the reported information is not based on complete fact. Sunlight and other climatic factors must be considered as very important. Since Unna[11] more than a half century ago first drew attention to the effect of actinic radiation as a carcinogenic factor, it has been known that this was of probable significance. The fact that persons engaged in outdoor work show a higher incidence not only of carcinoma of the lip but also of carcinoma of the skin bears out this point. Other climatic conditions, such as extreme cold, wind and dust, also must be given consideration. Cowan[12] has observed that both skin and lip cancer are strikingly more common among populations in particularly sunny areas and in high altitudes. It is a common observation that carcinoma of the lip, as well as of the skin, is usually more frequent in the white race than among Negroes. Certain authors have suggested that the profusion of melanin pigment in

9. Figi, F. A., Early Diagnosis and Treatment of Malignant Conditions of the Mouth and Lips. *Minnesota Med.* 13:788 (November) 1930.

10. Figi, F. A., Epithelioma of the Lower Lip. Results of Treatment. *Surg., Gynec. & Obst.* 59:810 (November) 1934.

11. Unna, P. G., *Histopathologie der Hautkrankheiten*. Berlin: Aug. Hirchwald, 1894.

12. Cowan, L. R., Low Voltage Lightly Filtered Roentgen Radiation Versus Radium and High Voltage Roentgen Radiation in the Treatment of Superficial Cancer. *Am. J. Roentgenol.* 42:556 (October) 1939.

members of the colored races is a protective factor.

Ebenius[4] grouped his patients in fourteen categories in the order of frequency with which carcinoma of the lip occurs in occupational environments. In general, outdoor workers head this list, and indoor workers are at the bottom. Soldiers are listed as ninth. The fact that lip carcinoma is more common in men possibly might be related to the higher percentage of male outdoor workers. It also has been suggested that men have a greater degree of normal prognathism than women; therefore, the lower lip is more exposed to the rays of the sun and the upper lip is protected from them.

Tobacco has been mentioned as an important exogenous factor. Ebenius[4] carefully catalogued his patients and reported that 70 per cent of the men and 57 per cent of the women were tobacco users. Practically all of these, both men and women, were pipe smokers. This unusual finding is due to the prevalence of pipe smoking among women in Northern Scandinavian areas. He and other workers concluded that there is ample evidence to indicate that pipe smoking is an important predisposing factor.

Mechanical, thermal and chemical injuries may be significant causative factors. Although statistics are not complete on this point, it has been our experience that injuries to the lip, such as those while shaving, are sometimes features of the account given by the patients. Ebel[13] and Broders,[14] however, are not convinced of the etiologic significance of mechanical trauma. In pipe smoking, mechanical irritation incident to holding the pipe in the mouth cannot be discounted, and it might well be that the heat generated in pipe smoking is a factor in producing thermal injuries. Actual burns of the lip are not common but they may be contributing factors.

Habitual use of alcohol is mentioned only exceptionally as a predisposing factor.

Summary

Undoubtedly the fact that this survey included chiefly young men accounts for the unusual findings in the data on age occurrence. It cannot justly be inferred that carcinoma of the lip is essentially a disease of young adults on the basis of these data, although there is probably some merit in the supposition that age changes in the skin and mucous membrane may be accelerated by excessive exposure to external climatic influences. Thus, the early appearance of senile elastosis in the upper corium might indicate a disturbed relation between the age of the mucous membrane or skin and the chronologic age of the patient. The modification noted in the skin and mucous membrane of farmers and other persons exposed to extremes of climate adds credence to these observations.

The information in this report as to duration, size and recurrence of carcinoma of the lip is significant in that these factors are likely to be closely related and indicate the value of early recognition and treatment. It would appear that when lip carcinomas are detected within the first year and treated adequately, either by surgical operation or radiation or both, a reasonably high percentage of success can be expected. Further lesions noted within this period are more amenable to treatment because of their size. It is likely that this factor is responsible for the selection of surgical operation by many of the clinicians as the method of treatment. One must remember, however, that a certain percentage of the tumors in this series first were seen in military installations where the clinician could not elect radiation as a means of treatment. The availability of medical care to members of the Army may account for the number of tumors seen

13. Ebel, H., Zur Statistic des Carcinoms der Unterlippe. *Beitr. z. klin. Chir.* 40:821, 1903.

14. Broders, A. C., Carcinoma of the Mouth: Types and Degree of Malignancy. *Am. J. Roentgenol.* 17:90 (January) 1927.

early in their course. However, lip lesions in general appear to have a shorter period of duration before treatment, perhaps because of their position where they often interfere with speech and eating, so that the patient seeks early care.

The ultimate value of this preliminary survey will, undoubtedly, lie in the additional statistics to be tabulated and their correlation with the clinical and morphologic studies. It is possible that through an accurate analysis and comparison of clinical manifestations and degree of malignant change suggestions may be made whereby early carcinoma of the lip readily may be detected. Certainly a means for the exclusion, clinically, of many of the lesions classified as Grade I carcinomas, which in the opinion of certain pathologists indicates carcinoma *in situ*, would be an important contribution. Little doubt exists that clinical diagnosis of many of these borderline tumors is equally as important as histologic analysis, since it is in the reporting of these equivocal malignancies that pathologists often differ. No conclusions are drawn from these data because of the additional material to be analyzed which may result in an alteration of some of the statistical information. —*Seventh Street and Independence Avenue, South West.*

POLISHING POWER OF DENTIFRICES: QUANTITATIVE STUDIES

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The development of a new tooth paste in the Sterling-Winthrop Research Institute made it desirable to obtain information as to the degree of polish produced on human teeth by dentifrices. A search of the literature failed to disclose any quantitative polishing methods which had been applied in this field. A qualitative method was described by Rider[1] based on the ease with which graphite markings can be removed from polished surfaces of teeth. However, if one deals with extremely highly polished surfaces, this method fails, since it is practically impossible to produce any markings on them with graphite.

Therefore, we developed an objective method for measuring quantitatively the degree of polish produced by dentifrices. This procedure is an adaptation of the method used for the measurement of the specular gloss of paint surfaces which utilizes accepted physical principles.[3] It consists of measuring quantitatively the amount of "mirror reflected" light from the tooth surface when it is illuminated by a constant beam of parallel light rays.

Apparatus

A schematic diagram and a photo-

Read before the International Association for Dental Research, Chicago, June 1947. A preliminary description of the apparatus was presented to the Scientific Section of the Toilet Goods Association, New York, May 16, 1947.[2]

1. Rider, T. H., Evaluating Dentifrices. *Am. Perfumer* 48:41, 1946.

2. Tainter, M. L.; Alford, C. E.; Hinkel, E. T., Jr.; Nachod, F. C., and Priznar, M., A Quantitative Method for Measuring Polish Produced by Dentifrices. *Proc. Toilet Goods A.* 7:38 (May) 1947.

3. A.S.T.M. Standards 1946 II, 1587, *Test for Specular Gloss of Paint Finishes.* Philadelphia: American Society for Testing Materials, 1946.

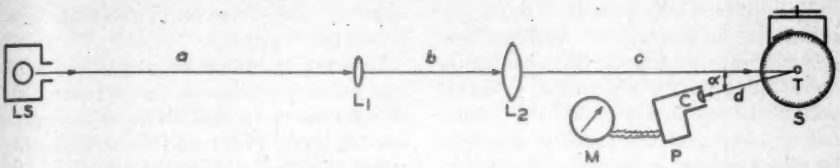

Fig. 1.—LS-light source; L_1-lens, achromatic, 1.5 cm. diam., F.5 cm.; L_2-lens, achromatic, 5.0 cm. diam., F.35 cm.; S-rotating stage; T-tooth mounted in center of stage; P-photoelectric system; C-photoelectric cell; M-microammeter; a-distance LSL_1, 38.5 cm.; b-distance L_1L_2, 14.2 cm.; c-distance L_2T, 34.6 cm.; d-distance TC, 14.2 cm.; α-angle of incidence of reflected beam, 11 degrees

graph of the apparatus developed are shown in Figures 1 and 2, respectively. It consists of a Bausch & Lomb photomicrographic illuminating lamp with a General Electric Mazda mercury tungsten arc bulb (30 amp., 11 v.), a lens system, a rotating stage specimen holder, a phototube with amplifying circuit and microammeter.

The tungsten arc bulb provides a light beam of high intensity which is sufficiently parallelized by the lens system so that differences in tooth dimensions are not critical. The specimen holder was so designed that it permitted the rotation of the tooth around both the vertical and horizontal axes, so that the light reflected could be directed onto the phototube from the area of maximum reflectance. The amplifying circuit is described in a bulletin published by the R.C.A. Manufacturing Co.[4]

4. *Form PT-2OR1.* Camden, N. J.: R.C.A. Manufacturing Co., 1940, p. 14.

Fig. 2.—Apparatus consisting of a light source, lens system, specimen holder, photoelectric system and microammeter

Within the working range of this apparatus, the microammeter readings bear a linear relationship to the quantity of light falling on the phototube. Constant voltage is supplied to both the illuminating lamp and the amplifying system by means of a 1,000 watt Raytheon voltage stabilizer.

Experimental Procedure

Extracted human teeth, preserved from bacterial attack and drying by immersion in thymol-saturated water, were used in this work. After cutting off the roots, the pulp chambers were drilled out to receive hexagonal metal shafts which were permanently set in with dental cement. These shafts fitted snugly into a hexagonal socket in the center of the specimen holder, thus permitting reproducible positioning of the teeth. The apparatus was tested for sensitivity and adjustment at frequent intervals by measuring the reflecting power of a working standard made from a highly polished opal glass plate mounted on the same type of shaft as the teeth. The initial light intensity was adjusted by means of an iris diaphragm, so that the light reflected from this working standard produced an amplified photocurrent of 350 microamperes. Under the same conditions a standard reference surface of magnesium oxide gave a reading of 30 microamperes.[5]

Upper central incisors were used for the studies since they possess a minimum of surface irregularities. In one series, the surface of these teeth were slightly flattened by grinding with an emery disk to form a larger reflecting surface. By selecting central incisors, only a small amount of enamel had to be removed to achieve this purpose. These flat surfaces were polished with 600 mesh carborundum to remove all visible scratches. Teeth so treated are referred to as "flats." All teeth before use were freed from any adherent dirt and stain by cleaning with dental grade pumice.

In order to obtain an unpolished surface on each tooth as a base reference, it was necessary to dull them to a reproducible level. This could be achieved by either mechanical or chemical means. It was determined experimentally that both methods produced the same base value and that the subsequent degree of polish was independent of the type of dulling treatment. The chemical method was selected because of its greater convenience. It consisted of immersing the teeth in 0.5 per cent hydrochloric acid for a period of 30 seconds, neutralizing the acid with a saturated solution of sodium bicarbonate and rinsing with distilled water. It might be pointed out that this concentration of acid is not entirely unphysiologic since it is about that of the gastric juice or of many popular carbonated beverages. Entirely comparable results were obtained in other series of experiments in which lemon juice was used for dulling.

The teeth then were wiped free of surface moisture with a soft tissue and placed in the apparatus, and their "dull" reflection was measured. These dull values, which represented the sum of extraneous room light and light scattered from the unpolished surface, ranged between 10 and 20 microamperes. They were found to be reproducible for each tooth within a range of about 5 microamperes in repeated cycles of dulling and polishing. This dulling procedure was employed prior to each polishing step.

The polishing was carried out manually with a dental engine and hand piece, using hard bristle brushes. The brush speed was kept constant at 4,000 r.p.m. by a variable voltage transformer with the pressure on the bristles such that they were slightly bent. Polishing time was measured with an electric timer. During polishing, the teeth were kept covered with a slurry composed of equal volumes of dentifrice and water. It was

5. *Letter Circular LO-547*. Washington, D. C.: U. S. Department of Commerce, National Bureau of Standards, March, 1939.

ascertained experimentally that the concentration of the slurry did not significantly modify the degree of polish developed.

After polishing, the teeth were washed with distilled water, wiped free of surface moisture and replaced in the apparatus, and their polish was measured. The polished tooth acted as a more or less perfect mirror to reflect light on the phototube, the amount of light so reflected increasing with the degree of polish.

The technic of measuring consisted of placing the tooth in the center of the rotating stage, adjusting the tilt and rotating the stage so that the beam of reflected light scanned the phototube. As shown in Figure 3, this resulted in the passing of the meter readings through a sharp maximum as the reflected beam passed across the phototube. The peak height was read as the reflectance value. The readings after polishing were corrected by subtracting their corresponding dull values. The corrected figures, which are a measure of the increase in reflected light, indicate the degree of polish attained and may be used as microampere values or transposed into ratios of any suitable standard such as a magnesium oxide surface.

Preliminary experiments with so-called flats indicated that most of the final polish was produced by the first 5 minutes of polishing. Therefore, in the first group of experiments this polishing time was selected for comparison of polishing power of commercial dentifrices.

Statistical Design of Experiment

Unflattened teeth were used in the first series. In order to eliminate the effects of the inherent variability of teeth a round robin procedure was employed.[6] Since six pastes and one reference powder were tested, random selection was effected by using a 7 by 7 Latin square design.[7] Forty-nine teeth were arranged in seven such Latin squares, the sequence being determined by tossing coins. This experimental design permits statistical treatment of the data.

Flats were used in a second series of experiments. Preliminary tests, in which repeated cycles of polishing and dulling were carried out, indicated that the previous Latin square design could not be used on flats since often, after about four cycles, the flattened surfaces developed slight convex curvatures which reduced the reflecting area measured and introduced an uncontrollable variable. Therefore, a two cycle polishing design was used for the flats. Forty-nine teeth arranged in seven groups of seven teeth each were used. This two cycle polishing design can best be illustrated by the following scheme:

AA	BA	CA
AB	BB	CB
AC	BC	CC
AD	BD	CD
AE	BE	CE
AF	BF	CF
AG	BG	CG

A, B, C and so forth represent the polishing steps with dentifrices A, B, C and so forth. Prior to each polishing, the teeth were dulled to their initial base level.

Experimental Results

The results obtained by use of this 5 minute polishing time are summarized in Table 1 for both sets of experiments. They are expressed in three ways; that is, as microamperes ± the standard error of the means, as percentage of the polish obtained with the standard calcium carbonate powder,[8] and as multiples of the reflectance from a standard magnesium oxide surface under the experimental

6. Tainter, M. L., and Epstein, Sidney, Standard Procedure for Determining Abrasion by Dentifrices. *J. Am. Col. Den.* 9:353 (December) 1942.

7. Fisher, R. A., and Yates, F., *Statistical Tables.* London: Oliver and Boyd Ltd., 1943, p. 53.

8. Tainter, M. L.; Epstein, Sidney, and Klein, Alexander, Determination of Particle Sizes in Dentifrice Powders. *J. Am. Col. Den.* 10:93 (March) 1943.

Table 1.—Summary of results after 5 minutes of polishing

Dentifrice	Central incisors (avg. of 49 teeth)			Flats (avg. of 14 teeth)		
	Micro-amperes	Percentage of $CaCO_3$ standard	MgO factor*	Micro-amperes	Percentage of $CaCO_3$ standard	MgO factor*
Paste F	190±9	345	6.3	397±5	325	13.2
Paste B	71±4	129	2.4	125±13	102	4.2
Paste A	63±3	115	2.1	140±14	115	4.7
Paste C	59±3	107	2.0	123±10	101	4.1
Calcium carbonate powder (San Francisco standard)	55±4	100	1.8	122±11	100	4.1
Paste D	44±3	80	1.5	74±7	61	2.5
Paste E	34±3	62	1.1	72±7	59	2.4

*As the magnesium oxide surface gave a reflection reading of 30 microamperes, the MgO factor indicates multiples of this figure.

conditions employed. The small standard errors of the means show that a large enough number of observations was made in each series to permit interpretation of the significant differences between the various preparations.

It is noted that the magnitude of the readings is larger in the series of flats, because of the more perfect nature of the reflecting surface (Fig. 3). However, if the readings are reduced to relative values by taking the calcium carbonate readings as 100 per cent in each case, these differences disappear and the data of the two series fall into a similar pattern.

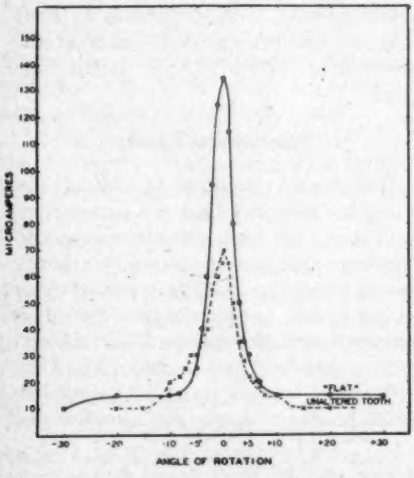

Fig. 3.—Angular distribution of reflected light from tooth surfaces

The relative polishing power of these pastes, expressed in microamperes, is depicted in Figure 4. It will be noted that the polish produced by the various pastes is considerably less than that produced by Paste F. Table 1 shows that in 5 minutes of polishing time on the normal central incisors, Paste F polished 2.7 times more than the best and 5.6 times more than the poorest of the other pastes. On the flats the corresponding values were 2.8 times and 5.5 times, respectively. If the average performance of these, the five leading pastes, is considered, it can be calculated that in 5 minutes on the normal central incisors Paste F produced 3.5 times as much polish as the other five pastes and on the flattened surfaces 3.7 times the polish.

It is not possible to correlate with any degree of assurance the polishing power previously summarized with the chemical and physical nature of the products used. They were all commercial pastes of com-

plex composition that did not lend themselves to easy analytical breakdown. However, qualitative tests to identify tentatively the main polishing agents and detergents were carried out, with results as summarized in Table 2. Paste F contained aluminum hydroxide of a submicroscopic particle size. Pastes A, B and C contained various insoluble phosphates, and pastes B, D and E contained chalk apparently of the general range of particle size commonly found in dentifrices of between 3 and 20 microns. The detergent in Pastes A, B, C and F appeared to be related to anionic synthetic soap substitutes described as sodium alkyl sulfates or sulfoacetates. Pastes D and E contained soap.

The specific polishing power of the individual ingredients could be determined reliably only if it were possible to test each separately in a slurry otherwise constant in composition.

The interrelationships between the polishing power and the chemical nature of the polishing ingredients, shapes of particles, size distributions, detergents, plasticizing agents and so forth are such large topics that they will have to be discussed in later studies.

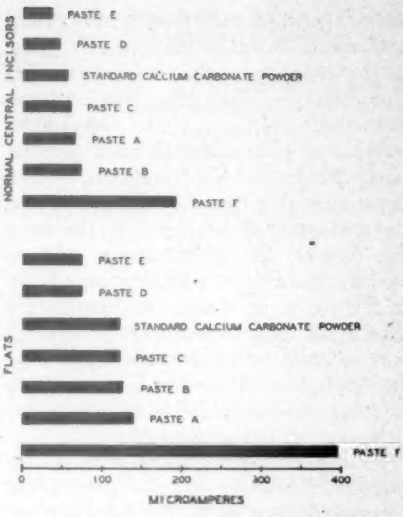

Fig. 4.—Degree of polish produced by tooth pastes in 5 minutes expressed in microamperes

In order to obtain additional data on the rate of polishing and the time required to attain maximum polish, five hand-picked central incisors were selected. They were arranged in a 5 by 7 Latin square, round robin design, as explained previously. Each tooth was

Table 2.—General composition of pastes and initial rate of production of polish in microamperes per second as calculated from the degree of polish after 1 minute of brushing

Tooth paste	Nature of polishing agent	Nature of detergent	Initial rate (microamperes per sec.)
F	Hydrated alumina	Anionic (sodium alkyl sulfoacetate)	4.06
A	Sodium hexameta phosphate and other insoluble phosphates	Anionic (sodium alkyl sulfate)	1.30
C	Calcium phosphate	Anionic (sodium alkyl sulfoacetate)	1.28
B	Calcium phosphate Calcium carbonate	Anionic synthetic detergent	0.97
D	Calcium carbonate	Soap	0.82
E	Calcium carbonate	Soap	0.56
Control $CaCO_3$	Calcium carbonate	None	0.53

dulled, polished with pumice for 2 minutes and re-dulled to the base level prior to the polishing with a new dentifrice. Consecutive readings of polish were taken after 1, 2, 3, 4, 5, 7.5, 10, 15 and so forth minutes of polishing with each product until the values were constant, within experimental error, for three consecutive 5 minute polishing periods. The average values in microamperes plotted against duration of polishing are shown in Figure 5. It should be emphasized that in all these experiments each tooth was polished by each dentifrice so that any individual differences between teeth in color and susceptibility to polish were balanced out in the averages.

As a quantitative expression of polishing rate, the tangents of the curves could be used. Because of the difficulty in reading the tangents accurately from the graph, the polish at 1 minute was used for the calculation of rates. The rate of polish then was computed in microamperes per second. Table 2 shows a comparison of the rates calculated in this manner for the dentifrices under observation. It is apparent that Paste F not only produces a higher polish but also does so more than four times as fast as the average of the other pastes at the beginning of the polishing procedure.

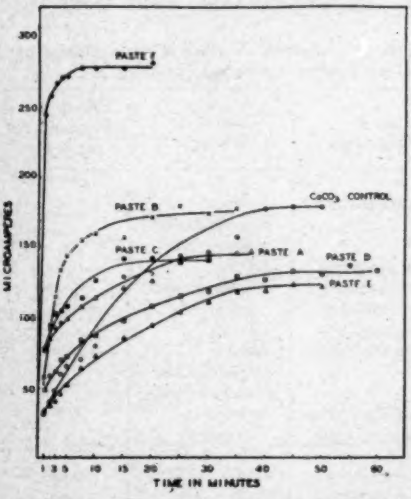

Fig. 5.—Rate of production of polish by six dental pastes and $CaCO_3$ powder

This series of experiments also was informative in indicating the relative polish that might be produced in the relatively brief time that is ordinarily spent in brushing one's teeth in the home. Actual measurements of the time spent have been obtained recently in another study which will be reported separately. One to 2 minutes appears to be the most customary time devoted to this hand brushing according to these new values. With such brushing the speed of motion of the bristles is considerably less than with the motor-driven brush of the present studies. Hence, it is likely that the 1 minute effect of the present series probably represents the maximum that might be expected from hand brushing in at least short periods of daily use. Therefore, the amount of polish at 1 minute may be taken as a reasonable approximation of the degree of polish which might be developed in the first few days of use of the dentifrice in question.

The data in Table 2 indicate that for this time interval Paste F produces 3.1 times the polish of the best of the others (Paste A) and 7.3 times the polish of Paste E, at the bottom of the list. When Paste F was compared with the average of the five other pastes, it was found that it produced 4.1 times the amount of polish in the 1 minute brushing.

Figure 5 also provides data as to what might be the ultimate degree of polish if the brushing were prolonged indefinitely. In Table 3 the maximum values are summarized. It can be seen immediately that not only does Paste F polish most quickly during the early stages of polishing but that it also surpasses all the others irrespective of how long the brushing is continued. In fact, Paste F produces in 7.5 minutes twice as much polish as the others do in an average of

33 minutes. This greater over-all efficiency can be expressed still more clearly by considering the rate of polish over the entire polishing period as summarized in the last column of Table 3. Paste F polished at an over-all rate of 37.1 microamperes a minute; Paste C, the next fastest from this standpoint, at a rate of 9.4 microamperes a minute, and Paste E, the least efficient, at a rate of 2.7 microamperes a minute. Thus, when time was given for production of maximum polish, Paste F polished four times as fast as the next best and 13.7 times as fast as the poorest of the series, or 7.0 times as fast as the average of the other dental pastes.

Therefore, Paste F shows a decisive superiority in polishing power whether this be reckoned in terms of initial or over-all rates of polishing or alternatively in terms of the degree of polish produced during any given time interval up to and including the time when maximum polish for each paste is produced.

It should be pointed out that polishing power is not the only criterion by which the quality of dentifrices should be judged. Abrasiveness and cleaning power are also important elements in their efficiency. The abrasive power now can be measured quantitatively by following the general principles and procedures described by one of us (M.L.T.) in an extensive series of papers or by similar methods. It is to be hoped that quantitative and reproducible methods for measuring cleaning power, which are applicable to teeth, also will be developed soon and reported.

Summary and Conclusions

A new method for the quantitative determination of polishing power of dentifrices for teeth is described. The apparatus consists of a light source, lens system, specimen holder, photoelectric system and microammeter. The change in intensity of the directional reflectance (mirror reflection) of a light beam from a human tooth before and after polishing, as read from the microammeter, is a measure of the amount of polish produced. The degree of mirror polish can be expressed in either relative or absolute values by the use of appropriate reference standards.

The speed and degree of polishing of six tooth pastes and a standard calcium carbonate powder were compared by use of a balanced experimental design which compensated for the variations between human teeth. A new type of dental paste polished many times faster than the other popular brands of pastes studied, both in terms of the initial rate of polish and of the rate of development of polish over the entire time interval up to the maximum effect. It also produced a much higher degree of polish than the others regardless of the duration of the polishing period selected for the comparison.

Now that abrasiveness and polishing power of dentifrices can be measured quantitatively, there remains to be developed equally accurate methods for determining cleaning power on teeth so that these three most important determinants of dentifrice efficiency may be evaluated and their comparative importance established, together with optimum values for ideal action.

Table 3.—Maximum polish produced by tooth pastes and the times required

Product	Maximum degree of polish, ma.	Time required for maximum polish, min.	Rate of polish for maximum effect, ma. per min.
Paste F	278	7.5	37.1
Paste B	179	25	7.2
Paste A	145	35	4.1
Paste C	141	15	9.4
Paste D	132	45	2.9
Paste E	123	45	2.7
$CaCO_3$ control powder	179	45	4.0

AN ESTHETIC THREE QUARTER VENEER CROWN: MODIFICATION OF STANDARD TECHNIC

Arthur G. Schultz, D.M.D., Seattle

THE three quarter veneer gold crown is recommended particularly in the construction of anterior restorations used as crown and bridge retainers, where appearance as well as maximum retention is a major consideration. The purpose of this article is to describe a new approach to this type of preparation. The retention attained by the use of the three quarter veneer gold crown is comparable to that of a full cast crown, provided there is sufficient natural tooth structure remaining so that the proper preparation can be developed.

The abutment in question must have enough tooth structure to permit the development of proximal grooves of adequate length as well as of proximal retentive walls and planes of adequate depth to assure stability. Experience and judgment are essential in order to determine whether the retentive walls are of sufficient strength to resist the forces which tend to displace such attachments.

The three quarter veneer gold crown also can be employed if decay of the proximal walls of the tooth is accompanied by loss of the incisal angle or if the incisal region is weak.

The three quarter cast gold crown is not recommended if the decay has included a considerable portion of the labial surface or if large regions of the lingual or proximal surfaces are involved with caries. I prefer in such cases to prepare full crowns (cast or porcelain) or full cast crowns with veneer facings of porcelain or acrylic resin.

Read at the eighty-eighth annual session of the American Dental Association, Boston, August 6, 1947.

Clinical associate professor, University of Washington, School of Dentistry.

Preparation

Initial Lingual Cut.—The first step is the removal of sufficient tooth structure from the lingual surface to allow for the desired thickness of gold. The cut, which is accomplished by stones or diamond cutting wheels, should conserve as much of the cingulum and gingival region as is practical. The cingulum should be as nearly parallel to the proximal grooves as possible to insure added retention.

After the initial cut has been completed and the bite has been checked thoroughly, the rubber-dam is placed to include approximately six teeth. Use of the rubber-dam is essential in that it permits the operator to work in a dry field with a minimum of interference from the tongue and lips; it retracts the gums so that the gingival region can be prepared more accurately, and it reduces the operating time.

Air is blown over the tooth during the entire operative procedure, since this reduces the heat and thereby produces less shock to the pulp.

Preparation of Interproximal Regions.—The slice preparation is not employed in the interproximal regions, since such an approach would require the removal of the bell portion in making the proximal walls parallel. Furthermore, such a paralleling of walls would necessitate the display of more gold than is desirable or essential. The "safe sided" carborundum disk, which in reality does not possess a safe side, or the separating disk is not used in this preparation.

To start the interproximal grooves a hole is made with a 700 or 700L cross-

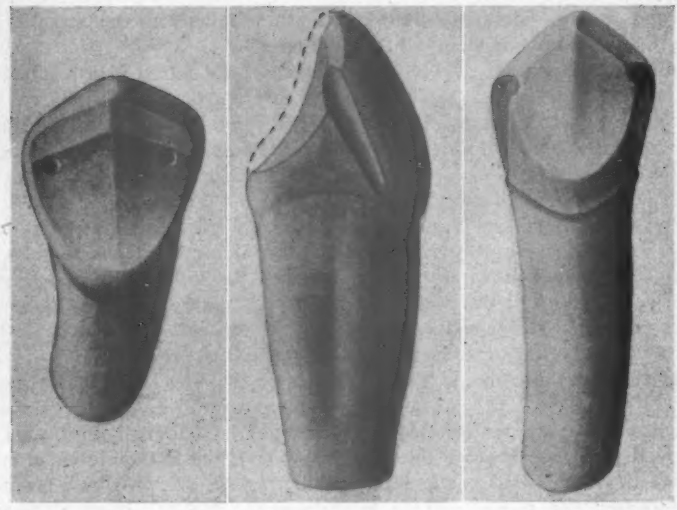

Fig. 1.—Left: Initial cuts in mesial and distal regions within the dentino-enamel junction. Center: Grooves are made parallel with the incisal two thirds of the labial surface of the crown. Right: Preparation of cingulum

cut fissure bur (Fig. 1, left). The fissure bur is inserted from the incisal-lingual area, just inside the dentino-enamel junction, thereby establishing a channel for the groove on the mesial and distal aspects. This channel is extended laterally through the enamel. Since some of the enamel in the interproximal region may crumble away in the extension of this step, caution is exercised so that the enamel of the adjacent tooth is not involved.

The mesial and distal grooves are made parallel with the incisal two thirds of the labial surface rather than with the long axis of the tooth. The grooves are made parallel labiolingually and slightly convergent mesiodistally. Each groove should extend slightly below the crest of the gingiva (Fig. 1, center).

The cuts having been completed with the 700 or 700L crosscut fissure bur, the chisels are employed next to plane away the unsupported enamel and to establish the labial outline in a self cleansing region.

If a tooth is missing on the mesial or distal side, the groove on that side can be started with a thin knife-edged stone and then deepened with the crosscut fissure bur.

The grooves, in addition to being extended slightly below the crest of the gingiva, may end with a slight shoulder having a slight gingival bevel. The development of the grooves by this technic and this approach to the interproximal preparation affords the maximum of retention. The end result also is favorable esthetically.

Completion of Lingual Cingulum and Axial Regions.—Tapered diamond stones are employed to prepare the cingulum region to the crest of the gingiva, and this section should be as nearly parallel with the proximal grooves as possible. A definite shoulder is not made at the gingival margin (Fig. 1, right).

The axial walls are developed with diamond instruments, such as small tapering and inverted cones (one inverted cone has a cutting surface on

the base and smooth sides; another has a smooth base and cutting sides). After these diamond instruments have been used, there still remains a small triangle of tooth structure gingival to the proximal cuts and lingual to the grooves. This section of enamel can be removed with thin flame-shaped diamond stones or 700 burs. Use of sharp chisels also has been found effective in this region.

Indications for Incisal Groove or Lingual Gingival Pin.—Since the three quarter cast gold crown is wedge-shaped and since the major forces are exerted gingivally, some form of stop should be employed.

It is believed that the majority of the anterior teeth are too thin for the use of the incisal groove, since such a cut tends to weaken the incisal surface as well as to shorten the interproximal grooves. Therefore, in reality retention is lost rather than gained. Optimum retention as well as protection in such cases is gained by a labiolingual bevel on the incisal surface and by a small pit in the cingulum not more than 2 mm. in depth, parallel with the proximal grooves (Fig. 2).

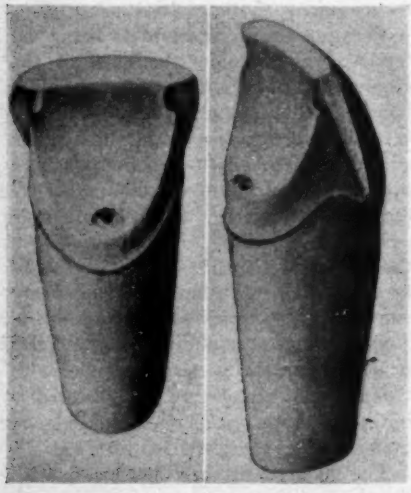

Fig. 2.—Lingual retention by use of a pit in the cingulum which is made parallel with the proximal grooves

The thick cuspid is an ideal tooth for the incisal groove. A definite cut is made in the incisal bevel, lingual to the labial enamel plate. The base of the incisal cut should form a slight acute angle with that of the labial wall (Fig. 3).

Finishing of Margins.—A rubber-dam clamp is inserted on the tooth to retract further the gingival free margins. The clamp is placed down to the cemento-enamel junction and blocked well with compound to prevent slipping. This permits placing the gingival margins of the restoration well under the gum margins.

A definite gingival finish line (not a shoulder) then is established from proximal surface to proximal surface (includes the gingival aspect of the grooves) with the aid of stones. The finish line is in reality on a curve or slope produced by the stones (Fig. 3).

The final finish of all the margins is accomplished with fine sandpaper disks.

Variations in Preparation

Extensive interproximal decay or a silicate filling precludes the development of a narrow groove, referred to in the previous paragraphs, and in such instances adequate retention can be obtained by a box preparation.

Another variation in the preparation of a tooth may be realized in those instances in which the forces of occlusion from the opposite arch are slight. The patient who desires to have as little gold shown as possible and who possesses a bite which will permit this variation may have the incisal margin directed lingually and thereby eliminate the covering of the incisal edge.

Fleetwood Impression Technic

Selection and Treatment of Band. — The rubber-dam having been removed, a thin, 36 gage annealed copper band, which is slightly larger than the tooth, is selected. The band is oiled, and a

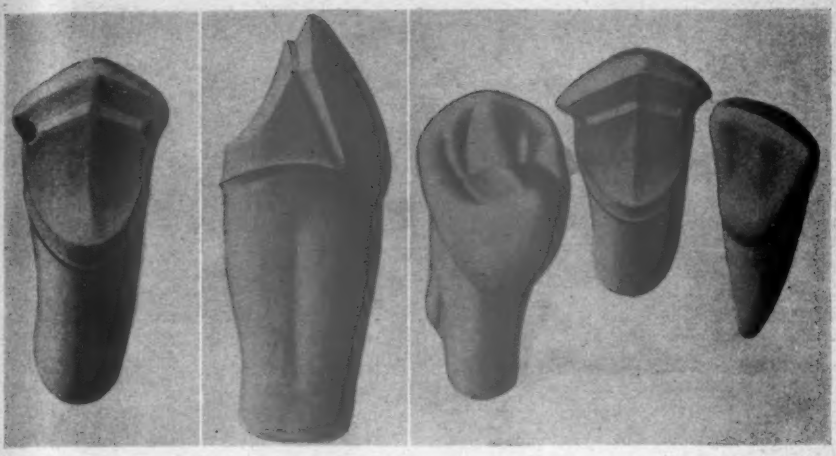

Fig. 3.—Left: Incisal cut utilized for retention, in place of the lingual pin. Center: Proximal view. Right: Incisal interproximal view

small notch is cut in one end, which will be the labiogingival margin of the band.

Impression.—The stick wax used for the impression should be hard as well as fairly tough and should not flake or become distorted during carving.

The wax is placed in the band and is chilled with cold water. The principle of the method is to have a minimum amount of wax in the warm flowing stage, and the remaining cold wax then can act as a plunger to force the warm wax out of the band as well as in close contact with all of the margins.

Since the three quarter preparation is wedge-shaped, the inlay wax in the band is heated accordingly. A heated wax spatula is forced up into the wax on the labial side, and then the spatula is tipped toward the linguogingival area of the band. A wedge-shaped area of warm wax is produced thereby, which is heated to the greatest depth on the labial side. The band, with the wax properly prepared therein, now is forced over the tooth preparation, in a labiogingival direction. Considerable pressure is used to compress the wax against all of the margins, and with this method it will be noted that the band actually pinches off the wax on the lingual side. The least amount of pressure is attained in the proximogingival area, and therefore a thin wax carver is used to compress the band axially in a labial direction. The result will be an excellent detailed impression.

Development of Wax Pattern

Removal of Band and Initial Carving of Pattern.—The wax impression on the tooth is chilled thoroughly with air. A sharp thin gold knife now is used to slit the band on the labial side, and during this process the impression is held firmly on the tooth with a finger. The cut always is made from the incisal aspect toward the gingival aspect, with a slicing motion. The impression may be displaced if the cut is made toward the incisal aspect.

The band is removed carefully, and the wax on the labial side is trimmed down to the proximal margins. An overhang on the proximal margins may result in a spreading of the pattern. The incisal and lingual portions of the pattern are left untouched at this time.

Removal of Partially Prepared Wax Pat-

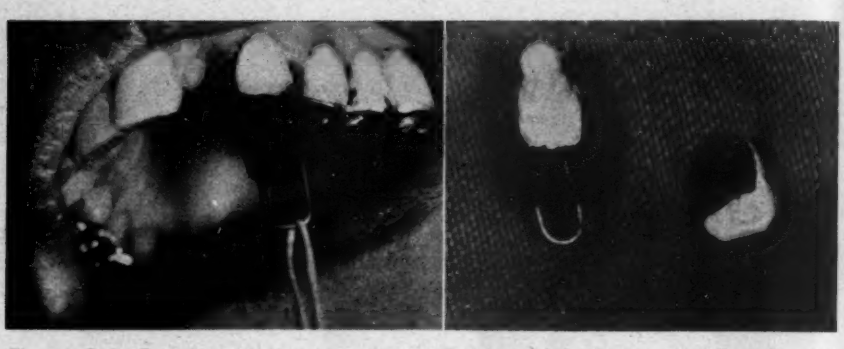

Fig. 4.—Left: Removal of wax pattern. A staple is inserted into the wax, and the entire pattern is removed with the aid of a ligature. Right: A hard investment is vibrated into the impression, and the final carving is completed on the investment die. Sufficient wax should be added at proximal contact to allow for the thickness of the band

tern and Making of Investment Die.—To remove the partially prepared wax pattern from the tooth, a small staple (made from a paper clip or pin) is inserted into the incisal end and a ligature is drawn through the staple. Tension is applied to the ligature in a line parallel to the proximal grooves. This technic of withdrawing the pattern eliminates some of the danger of distortion (Fig. 4, left).

The interior of the wax pattern should be glossy, if adequate pressure has been exerted in all directions. Metal pins are not employed, since the wax impression will include such retentive areas.

An investment die, to which the gold will be cast, is made at this time. A heavy investment, which will set up hard, is vibrated into the partially prepared wax pattern. The investment is mixed to such a heavy consistency that it will not flow without a slight vibration. With the incisal end down, the mix is started at the gingival margin with the aid of a fine camel's hair brush and it is vibrated gently down to the incisal edge. When the internal part of the pattern is covered, the investment is built up. The brush is held on the vibrator and the investment is permitted to drop in the desired place (Fig. 4, right).

Completion of Wax Pattern and Investment.—The final carving of the wax pattern is completed on the investment die. One should experience no difficulty in carving directly to the margins, and there should be no warpage since the investment model (die) will determine the shape of the internal part of the casting.

Wax is added at the contact points to allow for the thickness of the impression band. The pattern is sprued, and the investment model, which contains the wax pattern, is soaked thoroughly in water. The final investment, in preparation for casting, now is completed with the investment of choice.

Casting, Cementation and Finishing

The gold in all bridge attachments must be of sufficient hardness to withstand the stresses exerted by the bridge and the forces of occlusion and yet wear with the other teeth.

All gold castings should be inspected thoroughly for the presence of tiny gold nodules, and such regions must be removed before the casting is tried on the tooth. The internal part of the casting may be relieved, provided the margins are not disturbed and provided part of the gold which comes into contact with the lingual slopes of the proximal grooves is not disturbed. The lingual slopes of the proximal grooves exert a

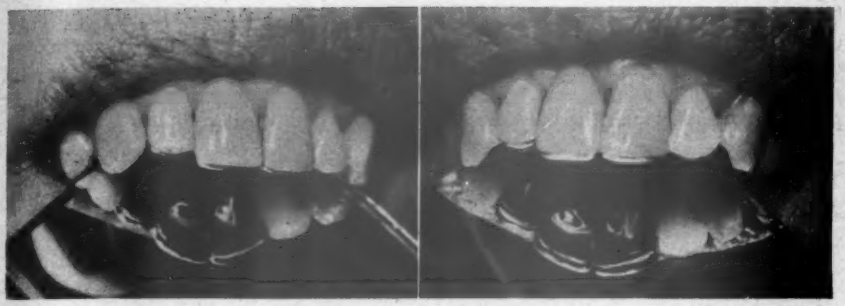

Fig. 5.—A fixed three tooth bridge in which two three quarter attachments have been utilized. Note that little gold is displayed in interproximal regions

labial force, and this retention should be maintained.

After the three quarter crown has been placed on the tooth, it is checked for occlusion and contact points. The next step is to place the rubber-dam with the use of the clamp, to expose all of the gingival margins.

The margins of the gold attachment are stoned lightly toward the enamel so that there are no overhangs. The gold is never polished near the margins unless the restoration is on the tooth, since, if the enamel is not used as a guide, the fine gold margins will be destroyed.

The tooth, without the three quarter attachment, is washed with hydrogen peroxide to remove the saliva or any blood. A crystal of thymol is melted between the beaks of cotton pliers, and the medicinal agent is flowed over the entire cavity preparation. Air is employed next to remove the excess thymol, and a cotton pledget dipped in chloroform is used to remove any thymol that may be on the margins. This antiseptic, which is one of the phenols, reduces the thermal shock by the cauterization of the protoplasmic extensions of the dentin.

To accomplish the cementation process the casting is placed on the tooth and then malleted into position, the operator exerting pressure on a plugger with a wooden point until the cement ceases to flow from under the margins. Since the fine feather edges of the gold may be pushed outward in the process of cementation, all margins are burnished with blunt spoons. After the burnishing is completed, a fine stone is run over the margins, the stone being rotated from the gold toward the tooth. Thin flame-shaped plug finishing burs or fine files can be used for finishing at the gingival-proximal margins. The final finish is accomplished with fine sandpaper disks, polishing from the gold toward the tooth (Fig. 5).

Summary

A technic for the three quarter cast gold crown is presented which eliminates the usual slice preparation on the mesial and distal aspects of the abutment tooth. The slice preparation in many instances requires the loss of appreciable labial tooth structure and thereby increases the amount of gold which must be shown. Maximum retention and functional efficiency, as well as other advantages, can be gained without the slice preparation.

The Fleetwood impression technic places extensive pressure on the wax at the time the impression is taken. It eliminates some of the hazards related to shrinkage and warpage.

If all of the steps outlined are fol-

lowed, there should be no cement lines evident at any of the margins including the gingival. The gold should be continuous with the tooth, and a sharp explorer should not catch the margins.

This three quarter cast gold crown is recommended particularly in anterior restorations, where appearance as well as retention is a major consideration.—*933 Medical and Dental Building.*

THE CONDYLE PATH: ITS LIMITED VALUE IN OCCLUSION

E. B. Owen, D.D.S., St. Louis

Since the advent of the Snow adjustable and the Gysi adaptable articulators many years ago there have been few important dental meetings or issues of leading dental journals that have failed to feature something in connection with the condyle path and its influence and importance in the field of occlusion. I began the study of this subject with the Gysi adjustable articulator as my first instrument, and for thirty-three years, working with many of the instruments and technics previously advocated, I have studied mandibular movements and checked results. In the following discussion some of the statements may seem revolutionary, some reactionary and others ridiculous, but they are made on the basis of my previous experience.

There might be some dentists who would be able to contradict me by pointing out the principles of lines, curves, angles and geometric figures, but Mark Twain once wisely said, "There ain't no use in arguin' agin a success." When theory and practice clash, there is something wrong with the theory.

I shall attempt to prove that in a vast majority of full denture cases registration of the inclination of the condyle path is entirely unnecessary. This is a rather rash statement, but I make it with the greatest of respect for any who may disagree with me.

Read at the eighty-second midwinter meeting of the Chicago Dental Society, Chicago, February 12, 1947.

Registration

In evaluating condylar movements, I will first consider the errors and fallacies of some of the methods of registering the inclination of the condyle path which are in constant use. Perhaps the method with which most dentists are familiar is the one which deals with straight protrusion of the mandible. With flat occlusal planes interposed, the patient is instructed to protrude the jaw an eighth, a quarter or half an inch.

This method is erroneous in the light of two counts, besides the fact that a patient is unable to determine the exact distance of movement: (1) the inclination of the condyle path varies with the amount of protrusion and (2) the registration is on a flat plane and does not take into consideration the opening that will be introduced when cusps are present.

Some operators prefer to set the respective paths by taking right and left lateral checkbites. This may give the correct inclination for lateral movements, but will not coincide with the protrusive

inclination and therefore poses a problem of choice in the record to be employed.

Stansbery[1] has a very accurate technic and instrument for recording maxillomandibular relations. He makes provision for the opening movement introduced by the cusps, and takes centric, right and left lateral as well as protrusive check-bites and sets and operates his instrument for all four positions. The following evaluation of his technic may be made: The right and left lateral checkbites, although admittedly correct, are unnecessary, as will be proved later in this paper. The protrusive registration would be accurate only if the upper and lower anterior teeth were in position when the registration was made, to give the exact distance the jaw would move in protrusion to bring the anterior teeth in functioning or end-to-end relationship.

Functional Range

As proof of the statement that in a vast majority of cases a registration of condylar movements is unnecessary the following basic facts are presented: When the teeth are together in centric relation there is no need for condylar movements, and when the jaws are open and the teeth out of contact, whether it be only a few millimeters or an inch, there is no need for such a record. Also when the jaw is extended laterally or protrusively beyond the functional range of the mandible there is no necessity for a condyle record. It is useful only in balancing the relation of the teeth when they are in functioning contact.

The physiologic movement of the condyle is dependent on the functional range of the mandible which in turn depends on the position and arrangement of the teeth. Functional range is the distance the jaw moves laterally from central occlusion to a point where the upper buccal and lingual cusps on the working side are directly above the corresponding ones in the lower jaw (Fig. 1), or the distance the jaw moves anteriorly from the centric point to a point where the incisal edges of the upper and lower anterior teeth meet edge-to-edge (Fig. 2). Therefore in speaking of the functional range of the mandible, practitioners refer to the distance the mandible moves after the teeth come into contact in the process of masticating.

A demonstration of the chewing process shows that the mandible opens, swings laterally, varying in degree with individuals, then starts the closing movement. The first contact with the upper teeth occurs when the respective upper and lower buccal and lingual cusps meet. The final masticatory stroke begins here and continues until the teeth are in central occlusion, a distance of approximately 3 mm. This is the greatest distance the mandible moves laterally that should be considered in establishing the condyle path.

The teeth may be arranged to give either a wide or a narrow range of pro-

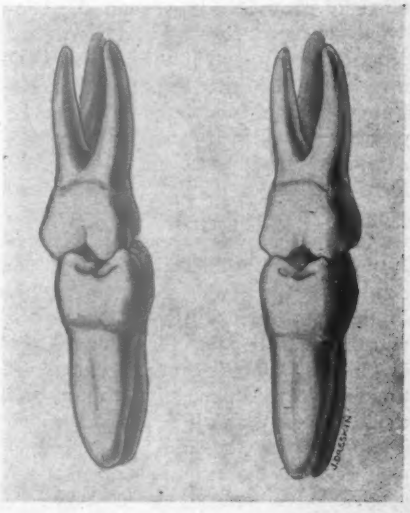

Fig. 1.—Anteroposterior functional range. Left: Central occlusion. Right: Indicates lateral movement of mandible

1. Stansbery, C. J., Functional Position of Checkbite Technic. *J.A.D.A.* 16:421 (July) 1929.

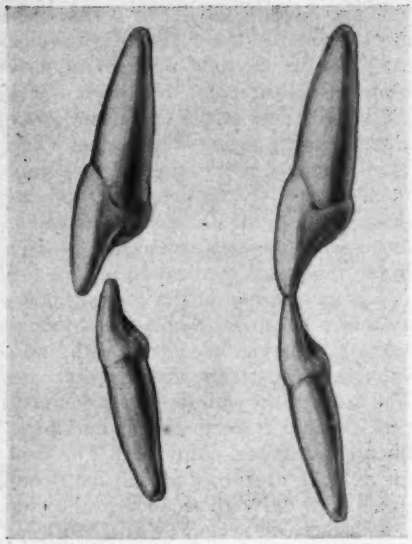

Fig. 2.—Left: Amount of separation when jaw moves anteriorly from centric point. Right: Incisal edges of upper and lower anterior teeth in end-to-end position

trusive movement (Fig. 3). In a wide range of protrusive movement the condyle head moves forward and downward proportionately, and if the teeth are set in accordance with this pattern a registration of the condyle path might be profitable provided such registration is approximately accurate. But if the teeth are set to limit the functional range of the mandible, the need for a registration becomes proportionately less. If the range is sufficiently limited, the condyle head would move so slightly in the fossa that it would not permit registration. In fact, the distance the jaw moves laterally from the plane of function to the plane of occlusion and the distance it moves in protrusion, which is approximately the same (about 3 mm.) would permit too little movement of the condyle in its fossa to make measurement possible.

The deeper the vertical overbite, the wider the horizontal overbite, and the wider the posterior teeth, the greater will be the functional range of the mandible. To limit the functional range would reduce to a minimum not only the width of the posterior teeth but also the vertical and horizontal overbites. The objection raised is that the movement of the mandible cannot be limited; if a person has been accustomed to a wide range of movement with his natural teeth, to restrict it with artificial teeth would inconvenience him too much.

True, the movement of the mandible cannot be limited; it may be extended at will far beyond the functional range, but the functional range may be, and is, controlled by both natural and artificial teeth. Any difference between the width of natural and artificial teeth and between the vertical and horizontal overbites would represent a difference in functional range. As one became accustomed to wearing a denture he would adapt himself in a relatively short time to the practice of swinging his jaw through a narrower arc. If the patient had been accustomed to a severe overbite with natural teeth (opening and protruding the jaw for a considerable distance to incise), restriction of this movement with artificial teeth that produce a slight vertical or horizontal overbite would cause inconvenience for a short time only. The new relationship of the anterior teeth would seem natural relatively soon.

With natural teeth the jaw may be thrown far beyond the functional range, but in this position there is no semblance of balance. Balance of either natural or artificial teeth is obtained only within functional range. If the range with artificial dentures is limited it is easier to attain that end.

Since I have mentioned plane of occlusion and plane of function, it may be well to explain the meaning of those two planes. The plane of occlusion is the plane in which the teeth rest when in central occlusion. The plane of function

is that in which the teeth rest when the jaw is opened as far as possible with the teeth still in functioning contact; that is, when the incisal edges are end-to-end or the buccal and lingual cusps of the upper jaw are directly above the corresponding ones of the lower jaw. The difference between the two planes is merely a matter of opening, determined by the height of the cusps and the depth of the vertical overbite. If cuspless or flat nonanatomic teeth are used, with no vertical overbite, the two planes are one and the same.

The Condyle Path

If registration of the inclination of the condyle path is considered unnecessary in a large majority of cases, it does not mean that a barn-door hinge may be used for an articulator. Teeth must be balanced within functional range when the jaw protrudes to the functioning position, as in incising. In the opening and closing of the jaw in the masticatory process, the buccal and lingual cusps of the maxilla strike directly above the buccal and lingual cusps of the mandible. This stroke must be made evenly or tipping and jiggling of the bases will result. Every effort should be made to eliminate trauma, which is likely to occur from friction of the bases.

It has been asked, "Of what use is balanced occlusion since in the functioning of the teeth there is always a bolus of food between them?" The greatest force is applied to the teeth after they come into functioning relation, beginning at the first point of contact and increasing as they slide into central occlusion in the crushing act. It is in the meshing of the masticatory stroke that balance is essential. Therefore, an articulator which affords lateral and protrusive movements is necessary, particularly if the patient has formed a nervous habit of continuously moving the jaw forward in end-to-end relationship of the teeth or laterally from centric point to the plane of function, tilting and jiggling the base of the denture.

Centric Relation

In those cases in which registration may be desirable, the following procedure, which I have been using for years, is simple and efficient. If good casts already have been produced from impressions made according to individual technic, baseplates may be adapted to suit the respective case. Baseplates do not need to be made of acrylic resin or vulcanite. They may be constructed from materials of the hard resinous variety, but they must be rigid and as well adapted as possible. The margins should be rolled back on themselves for reinforcement, and it might be necessary to make the lower one of extra thickness. However, a double thickness baseplate should not be used as it is too difficult to adapt. Instead, one of single thickness may be taken and enough material fused onto it to produce the required thickness. Both baseplates should be re-

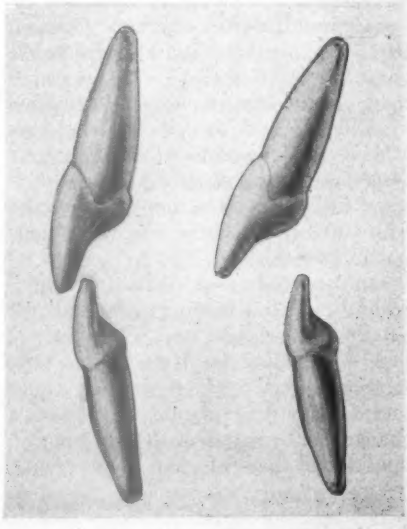

Fig. 3.—Arrangement of anterior teeth to give restricted or wide protrusive range

Fig. 4.—Registration with compound keys in position before lower posterior teeth have been placed in the arch

inforced with rigid metal bars. Occlusal rims are constructed and adjusted to the proper facial dimension with allowance made for the free way space as suggested by Gillis,[2] Thompson and Brodie[3] and others. Ample consideration for the free way space is one of the most important steps in the construction of dentures. This subject has been discussed thoroughly by Gillis.[2]

Centric relation is established either with the central bearing point and the needle-point tracing or with occlusal planes without the tracing. Once centric relation is established it must be maintained. Since the relation varies with a change in the width of the opening, an appreciable change from a given opening would throw the registration completely away from the centric point.

The casts are mounted on an articulator with adjustable condyle slots. The split cast method may be used by crisscrossing the base of the casts before mounting. This permits correct replacement on the articulator for grinding-in purposes after the curing process. When all the upper teeth have been set up, the case is tried in the mouth and the esthetic effects checked. If desired, the anterior teeth may be tried in before the posterior teeth are set up. This may save trouble if much manipulation is necessary to correct the factors concerned with the appearance.

The lower anterior teeth only are placed in position next and are arranged to the horizontal and vertical overbite position desired in the finished dentures (Fig. 4). With the trial dentures in the mouth the patient is instructed to protrude and retrude the mandible from the centric plane to an end-to-end relationship and back to the centric point several times, keeping the median lines of the two dentures perpendicular to each other. Possibly several minutes of practice will be required before the patient can perform the operation proficiently. The distance the jaw moves in the operation represents the functional range in which it should be moved when the registration is made.

Anteroposterior Range

With all the upper teeth and the anterior lower teeth in the arches, the remainder of the lower modeling compound or occlusal rim takes the place of the posterior teeth. These sections of modeling compound are crisscrossed to facilitate the next step. A small amount of adhesive powder is sprinkled onto each baseplate to aid in attaining stability, and the dentures are placed in the mouth again. A roll of modeling compound an inch long and about half an inch in diameter, previously softened in hot water, is

2. Gillis, R. R., Denture Space and Its Registration in Full Denture Construction. *Fort. Rev. Chicago D. Soc.* 11:5 (June 1) 1946.
3. Thompson, J. R., and Brodie, A. G., Factors in the Position of the Mandible. *J.A.D.A.* 29:925 (June) 1942.

placed on each side of the lower posterior occlusal rim. The patient is instructed to bring the teeth together in end-to-end biting relation with the median lines even, and to hold that position until the compound is hard. This gives a registration in the exact anteroposterior functional range. The compound represents the degree of separation in the posterior region. This device enables the dentist to return to the articulator to make the registration by setting the condyle slots (Fig. 5).

This method is open to the criticism of being only a positional relationship permitting the same inaccuracies in this respect that other methods do, but it does give a registration in the exact range in which the jaw will function when the teeth are in the mouth. This registration will also suffice as a measurement of lateral function since the distance the jaw moves laterally is only half the width of a posterior tooth. This distance is so slight that any condyle path will serve.

When the upper anterior teeth are set to the desired position for appearance and the lower anterior teeth are set to the proper position on the lower ridge, producing an anteroposterior functional range that will pull the condyle head down and forward on its path a distance of 5 or 6 mm., registration is advantageous.

This introduces the subject of the necessity of using the face-bow. Although the extent of its value is controversial, I find it helpful in my practice. To use the face-bow requires little time and is a very simple procedure. Its function of holding the casts in the correct position on the articulator establishes the correct radius for the curve of lateral motion and, in my opinion, justifies its use.

Summary

When the teeth are together in central occlusion; when the jaw is open and the teeth out of contact; when the jaw is extended beyond functional range, and where artificial teeth may be set to allow a functional range too slight to permit measurement, a record of the condyle path is not necessary.

In order to be of value condylar records must be made within the functional range. Either natural or artificial teeth must be present to determine this range. The degree of inclination of the condyle path varies with the amount and direction of protrusion. In registering condylar inclinations the difference between the plane of occlusion and the plane of function must be recognized since the inclinations are different on the two planes.

The plane of occlusion is the plane on which the teeth rest when in central occlusion. The plane of function is the plane occupied by the teeth in end-to-end contact. Functional range is the distance the jaw moves laterally from the centric

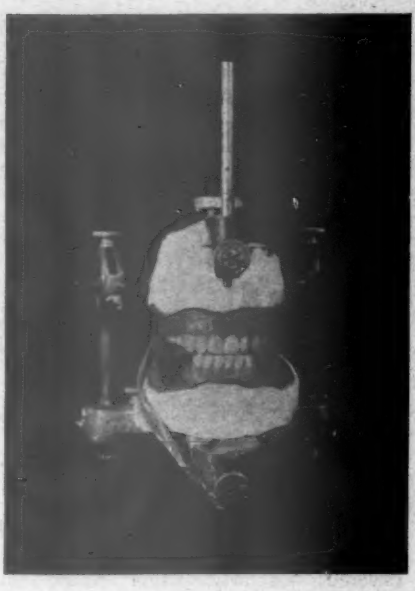

Fig. 5.—Most accurate method of registering th condyle path demonstrated by use of articulator. All upper teeth and the lower anterior teeth have been arranged for esthetic appearance and functional relationship

plane to a point where the upper buccal and lingual cusps on the working side are directly above the respective lower cusps; or anteriorly, from the centric plane to a point where the upper and lower anterior teeth are in end-to-end position. In the majority of cases a correct centric relation of the jaws maintained throughout the procedure and an occlusion balanced on an average condyle inclination will give satisfactory results.—*Ninth and Olive Streets.*

HYDROCOLLOIDS FOR FULL DENTURE IMPRESSIONS

Elmer E. Hachman, D.D.S., Baltimore

When Paul Revere carved ivory dentures for George Washington dental impressions were yet to be discovered; similarly, when Akers[1] introduced the one-piece casting as applied to removable bridgework, the hydrocolloid impression materials were not yet discovered. As plaster of paris presaged the first modern dental impression, the hydrocolloids mark a new milestone in impression materials and technics.

Since the purpose of a dental impression is to secure an accurate chart of the oral space that is to be occupied by the artificial denture, it should represent a detailed recording of the functional boundaries and general contour of the seating area. For the fulfillment of these specifications the impression material must possess sufficient flow to copy the minutest detail and yet set slowly enough to allow the tissues to assume a position of normalcy.

Adaptability

Needless to say, these qualifications are fulfilled by few impression materials in use today. These qualities are possessed to a substantial degree however by both the agar-agar and the alginate hydrocolloids. It seems almost incredible that these materials have been so fully relied on in making difficult partial dentures and precisely fitting removable bridges, and yet they virtually are untried by the mass of the dental profession as full denture impression materials.

In the past three years more than 90 per cent of the full denture impressions made in my office have been of the hydrocolloid type and by far the greater percentage of these were made with the alginate hydrocolloids. At first this was purely an experiment which included only those cases in which unsatisfactory results were anticipated. In many of these cases, however, results surpassed all expectations and encouraged some dentists to remake a number of impressions which had been virtual failures with other materials and methods. They were fairly successful with these also.

Before becoming overenthusiastic about materials which merely provide a means to an end, let it be stated that methods and materials must be integrated if more than average success is to be achieved. No claim is made or implied that the method described herein

1. Akers, Polk E., Partial Dentures, *J.A.D.A.* 15:717 (April) 1928.

is the only one which will prove successful. The success is attributed to the adaptability of the materials to the tissues.

Tissue Compression

Let it be emphasized at this point that the use of hydrocolloid impression materials in any full denture technic is diametrically opposed to all technics condoning tissue compression, as the hydrocolloids do not permit tissue compression or distortion. In analyzing the tissue compression idea it will be seen that those who believe in applying pressure may attempt to justify their procedure by pointing to the value of the generally accepted practice of postdamming. However, the application of pressure to the tissues of the soft palate after their true shape and position have been registered correctly in the impression is quite a different procedure. Although complete absence of pressure during the impression procedure is desirable it is not entirely possible. Any impression will be faulty, and to this degree pressure must be accepted. No two patients will tolerate exactly the same degree of pressure because of variable tissue tone. This is accepted as axiomatic because no two persons are exactly alike in every detail. Therefore, pressure beyond the unavoidable minimum must be considered undesirable. If in the judgment of the operator pressure is desirable, what assurance is there that adjacent, and perhaps more delicate, structures will not suffer irreparable damage? Is it sound technic to compress or distort tissues while taking an impression and then to relieve some specific area in an attempt to prevent circulatory strangulation or functional impairment by scraping the impression or adding to the cast?

Distortions

The ability of the soft tissues to accommodate themselves when subjected to pressure may be likened to that of a thin rubber ball filled with air or water. That is, if pressure is applied at any one point, causing an indentation, a comparable change in form will occur in some other part, resulting in the distortion of two or more areas, one compressed and the other distended. Dentures made from impressions taken in this manner look as though the tissues were being adapted to the denture instead of the denture's being adapted to the tissues (Fig. 1).

With few exceptions, nature can be

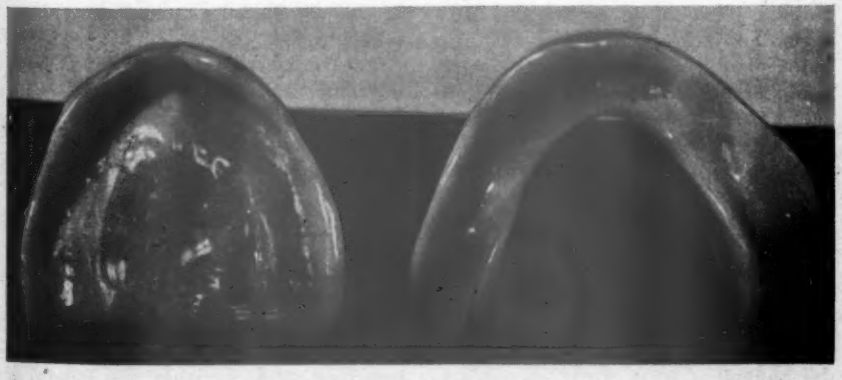

Fig. 1.—Upper and lower dentures made from impressions taken by a tissue-compression method. Note the lack of detail on both the denture seating area and periphery, and compare with Figure 2 which shows impressions of the same mouth

depended on for an orderly arrangement of the tissues of the body. In this connection, however, it is well to remember that nature made no provision for the restoration of lost teeth and when the dentist restores teeth by artificial means, to some degree the laws of nature are being violated. The least the dentist can do is to direct all efforts toward leaving the oral tissues in a natural and functional state. It must be recognized that the ability of distorted tissues to return to their normal position and shape will depend on the age and health of the patient as well as the general development of the musculature. The patient with young, healthy and active muscles often can dislodge some of the best fitting dentures, whereas the aged or infirm person with flabby inactive muscles will tolerate considerable muscle impingement before dislodging even an ill fitting denture.

The Impression

The ultimate shape of the denture is predetermined by the first step in its construction, the impression. A true registration of the oral tissues in a passive or natural state is the primary aim of the dentist. Care must be exercised in selecting and fitting the impression trays as well as in the actual making of the impression. Use of oversize trays that stretch and distort tender flexible tissues cannot be condoned. Such equipment would defeat any operator's best efforts and make it impossible to obtain a true functional impression. Likewise, the use of impression materials which set rapidly is to be shunned. The true functional impression can be secured when the tray covers the prescribed area with neither tray nor materials causing distortion, and when the operator and patient cooperate (Fig. 2). It is the operator's job to fit the tray, select the material and instruct the patient in what to do in order to obtain the best results.

The first step in impression taking is the comfortable seating of the patient. It is good procedure for the operator to seat himself beside the patient, on the same level or slightly lower. This will tend to give the patient composure and confidence. A dentist should never seat himself above a nervous patient and talk down to him. The operator then explains to the patient his part in the impression procedure. The patient should be told that he, as well as the dentist, has responsibilities and that his full cooperation will better enable the operator to construct the best possible denture. If the end result is a well fitting denture that is pleasing in appearance, the patient will become enthusiastic, and the operator will be paid in satisfaction for a job well done, good will, and new patients.

Relaxation

Complete relaxation is desirable, and an effort should be made to attain it. Often a suggestion by the operator that the patient keep his eyes open will relax tense muscles. This serves to divide the attention and thus to break down self-concentration. It has been said that man thinks with his muscles. This statement is at least partially true, for one cannot have a tranquil mind and tensed muscles, any more than he can have completely relaxed muscles and an active mind.

The next simple yet important consideration is nasal breathing. Mouth breathing must be avoided positively unless the nasal passages are obstructed. A good nose drop placed in each nostril a few minutes before the operation may be found very helpful. Third, a patient should never be allowed to hold his breath during a dental operation. Such action tends to increase nervous tension and therefore defeat all attempts at relaxation. Unhurried diaphragmatic breathing tends to make the patient a part of your working staff and therefore less expectant and tense.

Fig. 2.—Correct impressions taken with one of the alginate hydrocolloid materials. Note the fine detail of both the denture seating area and the periphery, and compare with Figure 1

Selecting and Fitting Trays

Trays of soft adaptable metal may be bent and trimmed at the chair until the operator is satisfied that the proper adaptation has been made. Or by laminating two brown resinous baseplates together with hard or sticky wax the operator may make a satisfactory tray more quickly. Any other method that will fulfill the needs of the case and prove satisfactory to the operator may be used.

Trays that conform to the general outline of the tissues without impinging on either the seating area or the peripheral tissues and are oversize from 3 to 5 mm. have proved satisfactory.

Trays may be tested for these qualifications by the placement of strips of soft carding wax across the ridge areas from buccal to lingual aspects, across the postdam area and completely around the periphery on the inside before the tray is seated for the final fitting. If these wax stops contact ridge tissue unevenly before the tray is seated, the tray is not properly adapted (Fig. 3). If peripheral tissues are distorted, the tray is undertrimmed.

After the tray is fitted properly a strip of soft carding wax is added to the upper tray in the postdam area. This is extended over the vertical as well as the horizontal part of the tray in this area. It is also permissible to place a piece of this wax over the area of the hard palate in order to prevent overthinning of the impression material in this area and consequent forcing of the tray too high

Fig. 3.—Lack of peripheral detail in the posterior lingual area. This is the result of improper adaptation of tray

in the muco-buccal fold. Inasmuch as some relief often is indicated in the palatal area of the finished denture, the wax can do no harm if placed over the hardest part of the palate.

Before taking the lower impression, the tray should be checked carefully with the wax stops in position from buccal to lingual aspects. These stops should be made to contact the crest of the ridge, and the tray should be trimmed at all peripheral points until it fails to reach the muco-buccal fold and the muco-lingual fold, from 2 to 4 mm. throughout. While the tray is seated in this position the patient is asked to extend the tongue as far as possible in order to determine the length of tray that can be tolerated in the posterior lingual area. This is important since the position of the tongue throughout the impression procedure will be forward and above the tray. This procedure tends to establish a functional outline for the entire lingual border of the finished denture.

The impression material of choice is the alginate hydrocolloid used in a plain smooth tray (without perforations or any adhesive material designed to retain the material in the tray). The tray should be well packed but not overfilled as too much material may cause distortion if muscles lack tone. Handles on trays are unnecessary but may be added at the operator's pleasure. The material should be well spatulated, and if the saliva is copious a slightly heavier than average mix is desirable inasmuch as the first contact with saliva will tend to soften the surface impression material slightly. In practice I always make a slightly heavier mix than indicated by the manufacturer as it produces a better mold.

Seating the Tray

The operator stands in front of the patient for insertion of the lower tray and in back of the patient for insertion of the upper tray.

After the tray is inserted in the mouth it is seated gently by slight agitation, care being taken not to use more pressure than is necessary to force the impression material to cover the impression area. Care should be taken to avoid entrapping air in the impression (Fig. 4). The patient's lips and cheeks should be lifted gently away from the periphery of the tray before it approaches the static position where it must remain immobile throughout the impression procedure. At this point it is often desirable for the operator to reiterate his instructions and suggestions for the patient's relaxation: slow regular diaphragmatic breathing, eyes open and muscles relaxed. It is sometimes necessary for the operator to supervise the patient closely in order to get reasonable cooperation. Proper manipu-

Fig. 4.—Result of entrapped air in the peripheral border in the region of the upper right cuspid

lation will allow the tissues, even though slightly displaced by impression material, to resume a normal functional position and shape before the impression material has set fully, both material and tissue coming to a position of rest.

Greater accuracy and a better and smoother cast will be the result if it is poured immediately on removal of the impression from the mouth. The cast should be separated as soon as final setting has taken place.

Dentures should be finished to the full extent of the impression. If the technic has been followed correctly, peripheral tissue impingement will be negligible.

Summary

The introduction of the hydrocolloid impression materials marked the beginning of a new era in the partial denture field. Use of these materials has passed from the experimental stage to their practically universal acceptance by the profession. Development of satisfactory procedures should insure adaptation of these materials to the field of full denture prosthesis.

Ease of flow of these materials enables the operator to adapt them to the most intricately abnormal tissue, and the slow setting qualities permit any tissue that may have been displaced during the impression procedure to assume a position of normalcy during the setting period.

The proper adaptation of suitably trimmed trays which are free from tissue impingement enables the operator to flow these materials into the muco-buccal fold to establish the functional limits of the denture. This procedure is particularly valuable in establishing the functional limits of the lingual flange of the lower denture.—*Calvert Bank Building.*

College Enrollment and Classroom Facilities.—The U. S. Office of Education has reported that American colleges and universities need to almost double their existing classroom facilities. They now need an additional 90,000,000 square feet of classroom space and will need a total of 300,000,000 square feet by 1950. The Veterans' Educational Facilities Program Section of the Office of Education pointed out that this is a construction job comparable to building an entire business district for a large city. This fall's college enrollment has been estimated to be 2,750,000 students, 600,000 more than last fall. It has also been estimated that in 1951-1952, the enrollment will drop to 2,477,000, rising again to 2,924,000 in 1959-1960.—*Science* 106:*414, October 31, 1947.*

CENTRIC REGISTRATION IN FULL DENTURE CONSTRUCTION

Richard Holic, D.D.S., Chicago

THE primary purpose of an oral prosthesis is to restore the function of an impaired masticatory mechanism. The word function includes not only pure masticatory activity, but also esthetic properties of the teeth. The more teeth to be replaced in an individual, the less the restored function is likely to reach the peak of efficiency afforded by a normal masticatory apparatus. However, every attempt should be made to restore the optimum. Function is attained through the restoration of occlusion. The restoration of occlusion in edentulous patients is one of the most difficult tasks confronting the dentist.

A satisfactory prosthesis depends on the correlation of skill on the part of the dentist and the ability of the patient to acquire use of the denture, to understand its limitations and to tolerate its presence. Therefore, restoration of function requires (1) a knowledge of the physiology of the masticatory mechanism, of psychology and of esthetic principles, (2) application of the basic mechanical principles and (3) the manipulation of materials adaptable to the technic employed to produce the resultant prosthesis. Each of the foregoing factors is dependent on the others. All must be correlated and integrated for success.

Although this discussion is concerned with the subject of centric registration, it must be remembered that the completed dentures are a culmination of all the procedures involved in their construction. They must, therefore, become a part of the individual within the normal limits afforded. This individual norm must be restored to its nearest optimum. In doing this the dentist must perform each step carefully. Centric registration is only one of the steps, but it is the most responsible factor in achieving success. Impressions are taken of the denture-bearing areas. It must be remembered that impressions are but negatives, and the casts are the positives. One of the objectives in the construction of full dentures should be the conservation of the denture-bearing areas so that the dentures will be useful to the patient for the longest possible time. Incorrect jaw relation, as shown by Thompson,[1] is one of the most ruinous factors in causing the resorption of residual alveolar bone. This resorption occurs more often beneath the mandibular denture than beneath the maxillary denture. Too much space between the maxilla and the mandible (too much depth in the dentures) in occlusion is the most frequent offense.

Occlusion between artificial dentures must take place within the intermaxillary space afforded by the normal maxillomandibular relationship. The determination of this normal centric position of the mandible and its registration is of primary importance if the dentures are to function within normal limits.

Most of the attempts toward the solution of the problem seem to be directed toward new technics and uses of new

Read at the midwinter meeting of the Chicago Dental Society, February 11, 1947.
Deceased September 4, 1947.

1. Thompson, J. R., The Rest Position of the Mandible and Its Significance to Dental Science. *J.A.D.A.* 33:151 (February) 1946.

materials. The fabrication of materials in the construction of prostheses must be directed toward their adaptation to the individual. Technics should include both the art and the science of dentistry. Unfortunately, in the past many dentists have given more attention to the esthetic problems and less to the scientific principles in the construction of dentures.

Dental Arches

A brief analysis of the normal dentition will show the comparable status of the infant without teeth and the edentulous patient. At about 4 to 5 months of age the teeth begin to erupt. With more and more eruptions the arches lengthen posteriorly. The growth of the jaws keeps pace with the demands for more space. This continues until the permanent dentition is complete. It would seem that the previous statements would have little or no application to the edentulous state, but many similarities do exist between the infant and the edentulous adult. In the resting infant the gum pads are not together, but apart, with the tongue between them. This condition exists in the edentulous adult also. Thompson and Brodie[2] have stated, "The pattern of the head of the individual is laid down before the third month of postnatal life, probably very much earlier, and thereafter does not change. The mandible assumes its preordained relation with the rest of the face and head long before any of the teeth have erupted, and this position is constant and characteristic for the individual." The teeth erupt into a fixed intermaxillary space and occlusion develops with jaw relationships already established. Occlusion develops as a result of jaw position. The occlusion of the teeth does not determine intermaxillary relations. The constancy of this jaw position in the edentulous patient has been proved by Thompson.[1] The edentulous patient has lost only his teeth and some of the supporting structures. The neuromuscular mechanism and the reflexes determining and maintaining the rest position are not affected.

Forces Affecting Eruption

Since teeth erupt and come into occlusion within fixed limits over a period of years, replacing them with full dentures is difficult. However, there are present in every person fixed factors which aid in correct placement of dentures. Each tooth in a normal dentition is in a position of dynamic equilibrium of all forces acting upon it. If it is otherwise, it will shift to such position as a result of the forces of occlusion. But what determines the level within the predetermined intermaxillary space at which occlusion will take place? Labially, buccally and lingually the teeth are held in their arches by the limiting structures, the lips, the cheeks and the tongue. Teeth are said to be in active eruption until they come into their functional positions. But what stops this eruption? It is a well-known fact that teeth devoid of occlusion will erupt. A potential force of eruption must exist in the units of the normal dentition. Since the teeth are in positions of equilibrium, this force of eruption must be opposed by an equal one. The resulting occlusion then must occur at the level where the force of occlusion equals the force of eruption.

All bodily force and movement are produced by muscles. These muscles, attached to their respective osseous structures, are responsible for all movements, and the position of any part of the body is the result of muscular forces acting upon it. Mandibular position and its relation to the rest of the face and head are determined basically by the musculature attached to it. Force generated by these muscles acting on the mandible is equal to the force of eruption when the arches come into centric occlusion. The maxillo-

2. Thompson, J. R., and Brodie, A. G., Factors in the Position of the Mandible. *J.A.D.A.* 29:925 (June) 1942.

mandibular relation existing when the mandible is in this centric position must be determined and registered, and occlusion must be established within this centric intermaxillary space when full dentures are being constructed.

Muscle Tonus

In taking a measurement or in making a registration, it is advisable to begin from a fixed point if possible. In determining the centric position of the mandible, the physiologic rest position constitutes the fixed point. This is the position from which all mandibular movements start. Its position is constant in the respective individual, whether or not teeth are present. The position the mandible assumes at rest is dependent on musculature controlled by the physiologic mechanisms governing posture. The characteristic erect posture of man does not happen by conscious effort but is maintained by stato-tonic reflexes when he stands erect. These stato-tonic reflexes are most highly developed in those groups of muscles which resist gravity. They maintain these muscles in a constant state of tension known as tonus. When these stato-tonic reflexes are blocked, as in a state of unconsciousness, the body collapses.

The groups of muscles which are under the necessary amount of tension to resist the force of gravity and to maintain normal posture are known as antigravity muscles. These are, by and large, the extensor muscles. The muscles of mastication are antigravity muscles and act as such. The total posture of the body consists of the sum total of the posture of the component parts. Physiologic rest position then becomes the normal posture of the mandible. The position of the mandible at rest is one of equilibrium of all the forces acting on it. Physiologic rest position is a reflex position. Any other position the mandible assumes is a functional one. Centric position is functional.

The ultimate value of any knowledge is its practical application to the solution of a specific problem. This application should be made as simple as possible in order to obtain the desired result. Niswonger[3] and Gillis[4] have made clinical observations of the rest position and its constancy, and have offered methods of its application to centric registration. Thompson's[1] most recent research on the rest position has been done by means of roentgenograms and the Broadbent-Bolton cephalometer. His outstanding work has proved the constancy of the rest position in the edentulous individual and the disastrous results attendant on increasing the vertical dimension by means of full dentures.

In recent months an attempt has been made to evolve a technic of centric registration that is simple and yet gives the desired results. The technic described by Niswonger[3] was chosen as the first to be evaluated and was modified subsequently into the technic to be described. Cephalometric roentgenograms were made for each patient in order to determine the rest position. Roentgenograms were also made of the patient with the completed dentures in centric occlusion. Tracings were made of each roentgenogram, and the amount of free way space or any violation of the rest position was noted. No attempt was made to apply the findings to the clinical procedures. Evaluation was made only after the dentures were completed.

In using this technic, no violations of the rest position were noted, and the results, both from the view of the patient's response and the ease of application of the technic, were gratifying. This method has been taught to postgraduate students and all have expressed satisfaction with its simplicity and the uniformity of results, as indicated by the response of the patient.

It must be remembered that a func-

3. Niswonger, M. E., The Rest Position of the Mandible and Centric Relation. *J.A.D.A.* 21:1572 (September) 1934.

4. Gillis, R. R., Establishing Vertical Dimension in Full Denture Construction. *J.A.D.A.* 28:430 (March) 1941.

tional position of the mandible and its relation to the remainder of the face and head is being recorded and that the rest position is the first step in determining this position.

The centric position of the mandible in relation to the three planes of the body must be found. Position of the mandible is determined by the musculature. Its position in the mid-sagittal plane is determined first. Then its position in the transverse plane is determined, and lastly, the position in the frontal plane. When the mandible is in its rest position, the teeth are not in occlusion but are a slight distance apart. This space existing between the arches when the mandible is in its rest position is known as the free way space. The condyles are in their normal position in the glenoid fossae when the mandible is in the rest position. The movement of the mandible from its rest to its centric position is essentially hinge-like. In some individuals the movement may be translatory.

Vertical Positioning

The first step in making centric registration is to determine the position of the mandible in the sagittal plane. The mandible is already suspended from two areas, the temporomandibular joints, and the third area must be determined. Finding the rest position is the initial step in determining the vertical position of the mandible. The patient is seated erect in the chair without support to the head. This is important since only the physiologic factors which maintain posture at rest should be operating, and an extrinsic support might interfere with determination of this position. With an ordinary mascara pencil, two circular dots 1 to 2 mm. in diameter are placed on the skin of the patient, one above the bridge of the nose and between the eyes over the area of the junction of the nasal and frontal bones, and the other on the skin over the point of the chin.

Both of these marks are on the skin areas which are relatively stable and are not affected by the wax occlusal rims in the mouth. The mandible usually will maintain the rest position, it being the most comfortable, and therefore, no instructions are necessary.

The distance between the two marks is measured. A suitable measuring device is a pair of ordinary draftsman's calipers, preferably with a thumb-nut adjustment. The points of the calipers should be parallel so that the upper point can be tangent to the upper portion of the upper dot and the lower point tangent to the bottom of the lower dot in order to insure correct placement of the points each time a measurement is taken.

Phonetic Aids

After the face is so marked, an initial measurement is made and recorded. The caliper points are placed on a meter rule and the distance recorded. There are certain aids, phonetic and functional, which enable the patient to assume a rest position. Phonetic aids, as Gillis suggested,[4] must parallel the desired movements of the mandible but must not indicate definite masticatory movements. Pronunciation of M or Emma will put the mandible in the rest position. The patient is instructed to make these sounds slowly and to keep from moving until the measurement is recorded. A slight interval should precede each sound. This procedure should be repeated several times. It is best to instruct the patient beforehand each time.

The process of swallowing is a functional aid. After swallowing, the mandible comes back to its rest position. This function is of value in checking the rest position as measured.

When the rest position is found, each measurement will be identical to the preceding one. At least six identical measurements should be recorded before one can be sure that the distance measured is that obtained when the mandible was in its rest position. The measurement used

must be one which is found constantly at the rest position rather than an average of all the records of the face height. Duplication of this measurement enables a dentist to verify the distance between the face markings while the mandible was in the rest position.

The distance occurring between the marks can be described as the physiologic face height. The facial markings are allowed to remain until the centric registration has been completed since it is difficult to place new markings in exactly the same spots each time.

The chair is adjusted to the patient, and the head is supported. The maxillary wax occlusal rim is inserted and trimmed to the lip line, and the surface is flattened to the desired plane of occlusion. Once the level of the plane of occlusion is determined in the maxillary wax occlusal rim, it is no longer altered as far as occlusal surface is concerned.

In a normal dentition the arches are not in occlusion when the mandible is at rest, but a distance known as the free way space exists between them. Niswonger[3] found that 87 per cent of the patients he measured had a free way space of 3 to 3.5 mm. when measured on the outside of the face. Gillis[4] has stated that the free way space between the incisors on completed dentures should be 3 mm. It must be noted that physiologic face height is longer than the face height that exists when the teeth are in centric occlusion. The latter can be identified by the term centric face height. Physiologic face height minus centric face height gives the height of the free way space.

In the edentulous patient the physiologic face height can be found by subtracting 3 to 3.5 mm. from the physiologic face height, as the case may allow. The centric face height is determined, and the occlusal rims are brought into contact with each other. Once the face height and plane of occlusion are determined in the maxillary wax occlusal rim, the mandible occlusal rim is inserted and either raised or lowered to come into occlusion with the computed centric face height. This establishes the position of the mandible in the sagittal plane.

Centric Occlusion

Once the mandible has been oriented in the sagittal plane, its positioning in the transverse plane is relatively easy. The condyles at rest are in the same position in the glenoid fossae as they are in centric occlusion. Simple closure from rest position to occlusion usually denotes the maxillomandibular relation that should exist when the mandible is in the centric position. It is at the level of occlusion and in this maxillomandibular relationship that the artificial teeth are arranged in the normal order in which they should occur when the dentures are in centric occlusion.

The patient should be instructed to open and close his mouth slowly several times, or until the position of occlusal contact between the wax occlusion rims is noted. The opening should be only 3 to 4 mm. from occlusal contact. If the mandible can be placed at rest with the occlusal rims in place, the amount of free way space can be noted. This can be accomplished easily in the majority of patients, but in some the presence of the wax occlusal rims may make the rest position difficult to obtain. Simple closure from the rest position usually gives the occlusal relation between the wax occlusal rims that should exist at centric occlusion, since the position of the condyles in the glenoid fossae is relatively the same whether the mandible is in centric or rest position. The patient should voluntarily bring the jaws into the same occlusal position each time. No force should be exerted by the dentist to obtain the most retruded position of the mandible since this position is not normal at centric. The position the mandible assumes at centric is determined by the functional balance of the musculature responsible for bringing and maintaining

this functional position. Centric position is a functional position or a position of strain and cannot be held too long without producing fatigue.

Once the patient becomes accustomed to the same position the mid-line of the face is transferred to both wax occlusal rims, and the rims are fastened rigidly together in centric occlusion. The rim assembly can be removed and the bite fork of the face-bow attached to either the upper or the lower bite block. This assembly is returned to the mouth and the registration of the face-bow is made.

The Gothic arch tracer may be employed for positioning the mandible anteroposteriorly once the centric face height has been determined. The mandible must first be positioned to its correct level in the sagittal plane before any attempt can be made to position it in the transverse plane, regardless of the method used.

Summary

When the centric position of the mandible has been determined and a centric registration made, the following four major relations are recorded:

1. The relationship between the denture-bearing areas.
2. The amount of available intermaxillary space.
3. The position of the plane of occlusion in the intermaxillary space.
4. The distance from the heads of the condyles to the wax occlusal rim assembly and any individual asymmetry that exists are transferred to the articulator by means of the face-bow.

Full dentures must be constructed within the normal limits afforded by the patient. Centric occlusion is the result of a preordained mandibular position within a given intermaxillary space that is normal for that person. This centric position and its relation to the rest of the face and head must be determined and registered. The starting point in determining centric position is the rest position of the mandible. A free way space of 3 to 3.5 mm. in the incisor region should exist between the completed dentures. The first step in making a centric registration is to position the mandible in the sagittal plane. The position of the mandible in the transverse plane can be determined then with relative ease.

The rest position is the most comfortable position the mandible can assume. It is a nonfunctional position but it is the position from which all functional movements start. The centric position is one of conscious effort and is a functional position. Repositioning of the mandible by means of dentures is impossible since its normal position will be maintained and any changes made will be at the expense of the denture-bearing areas. This holds true not only for an excessive vertical dimension when the dentures are in occlusion but also for any eccentric occlusion which may exist, even though it occurs at the correct level. Any incorrect position of the mandible in the transverse plane will not be accommodated.—*808 South Wood Street.*

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Sale of Radioisotopes.—Dr. Paul C. Aebersold of Oak Ridge, Tenn., disclosed that the country is taking a heavy loss on the sale of radioisotopes to other nations. The United States Atomic Energy Commission is offering the radioactive materials at prices ranging from $1.10 to $52 per unit, while some of the material is estimated to have cost at least a million dollars per unit when produced by cyclotron. The commission announced that the first shipment of radioisotopes to go abroad was a small quantity of radioactive phosphorus (P^{32}) sent to Australia for treatment of a rare blood disorder. The shipment inaugurated the American policy of sharing peacetime atomic benefits with other nations.—*J.A.M.A. 135:166, September 20, 1947.*

ESTHETIC RESTORATIONS IN PROXIMAL SURFACES OF MAXILLARY ANTERIOR TEETH

Alexander W. Jeffery, D.D.S., Seattle

FILLINGS that properly restore the proximal surfaces of the anterior teeth prevent or retard the loss of the incisal angle. The materials used to restore the proximal surfaces of the anterior teeth are silicate cement, gold in the form of gold foil or inlays, porcelain and acrylic resin. The desirability of gold foil properly placed is unquestioned except in those places where it is esthetically displeasing. In such cases porcelain is indicated. The qualities of the other materials are too well known to require discussion, and it is a regrettable fact that the least permanent are used the most frequently.

Whenever possible, the distal surfaces of the cuspids should be restored with gold foil fillings, inasmuch as cavities in this location do not require consideration of appearance. Ample access is obtained both labially and incisally, and proper preparation of the cavity makes this one of the easiest gold foil operations.

Approximating cavities usually occur on the mesial surface of the maxillary cuspids and on the distal surface of the lateral incisors, and restoration of these regions should be considered simultaneously.

Subsequent to the placing of the rubber-dam, a No. 1 or 2 Ferrier separator is adjusted to position. The distal bow is held as close to the occlusal surface of the bicuspids as possible. This provides ample access to the distal surface of the lateral incisor and retracts the rubber-dam and interproximal tissues from the mesial surface of the cuspid. The separator bows are secured in position with small amounts of compound on both the incisal and occlusal surfaces of the teeth.

A slight separation of the teeth is attained, and the cavity in the mesial surface of the cuspid is opened slightly to provide additional access to the distal surface of the lateral incisor. A gold foil filling may be inserted in the distal surface of the lateral incisor, since this surface is obscured from view when the teeth return to normal position. The mesial surface of the cuspid usually requires a porcelain inlay. The cavity may be prepared and an impression secured at this time.

Simultaneously, consideration should be given to the distal surface of the central incisor and the mesial surface of the lateral incisor.

In case of initial caries toward the lingual surface of the central incisor, gold foil is inserted from the lingual side. This leaves the labial surface intact and conceals the filling from view. Should the caries process involve the labial aspect, the preparation for the reception of a porcelain inlay is made from the labial side.

The mesial surface of the lateral incisor, for esthetic reasons, usually requires restoration with a porcelain inlay. Caries on the mesial surface of the central incisors usually involves the labial plate of enamel and requires porcelain inlay restorations.

Read at the eighty-eighth annual session of the American Dental Association, Boston, August 7, 1947.

Various technics for the construction of porcelain inlays have been published since the beginning of modern dentistry. Unfortunately since the advent of silicate cements as temporary esthetic fillings these technics have received little consideration from the dental profession. A definite technical procedure will secure positive results and eliminate many difficulties.

The operator should visualize the prepared cavity and the completed operation. The centric bite and protrusive and lateral excursions of the teeth should be noted, and if the opposing teeth strike the enamel in the region in which the lingual margin of the filling will be placed, the enamel should be rounded into the embrasure.

The colors, depth of colors and shadings should be noted from all angles and positions. As a general rule, a porcelain inlay on the distal surface should be made lighter than the color of the tooth by elimination of the gray shades and use of the lighter yellows. Restorations on the mesial surfaces of the central and lateral incisors usually should be the same color and shade as the tooth, and on the mesial surfaces of the cuspids they may be a shade darker, with a tendency toward a brownish gray. In some cases it is advisable to have the patient return for observation of color and shade under different conditions of light and after removal of decay.

Preparation of Cavity

After these observations are completed, the rubber-dam is adjusted over at least two teeth mesial to, and two teeth distal to, the tooth to be operated on. A No. 1 or 2 Ferrier separator is positioned and the bows blocked on the linguo-incisal aspect with small amounts of modeling compound, the labial part of the bows being left free from the tooth. The threaded bars of the separator are turned to move the teeth slightly apart. The rubber-dam is drawn tightly over the interseptal tissue, clearly exposing the gingival areas of the approximating teeth.

Few instruments are necessary for the preparation of this type of cavity. A contra-bevel chisel is used to break down the labial enamel, care being taken not to form a sharp angle or fracture the enamel beyond the region of the cavity. In most cases a No. 557 crosscut fissure bur is used for the greater part of the preparation. The labiogingival portion of the cavity is established first. The bur is placed into the cavity at almost right angles to the long axis of the tooth, with the shank of the bur and the handpiece resting near or against the labial bow of the separator. The position of the labiogingival part of the cavity determines the entire outline with the exception of the lingual wall. The bur is now carried incisally in a line which will be in harmony with the lobe of the tooth in which the cavity lies, forming a graceful curve into the incisal area. The gingival wall is established at a slightly obtuse angle to the axial wall. The operator continues to work from the labial side in the preparation of the linguogingival portion of the cavity. The end of the bur is used to make as sharp an angle as possible in the interior of the cavity, but as the exterior surface is approached the bur should be lifted from the gingival toward the lingual wall to form a continuous curve in the outline of the cavity.

The lingual wall is prepared with the end of the bur, the shank of the bur being held against the approximating tooth. As the operator approaches the incisal area, the bur is held almost at right angles to the axial wall, giving a very slight outward flare to the cavity. During this cutting the axial wall has been automatically prepared.

At this point it is advisable to place a small amount of thymol or cavity lining on the axial wall, forcing it into the dentin by blasts of warm air. This eliminates

the need for cavity lining when the inlay is cemented to place.

The cavity is finished with a chisel having a blade approximately 0.9 mm. wide and 3 mm. long, at an angle of 2 degrees to the shaft of the instrument. In some instances it may be necessary to use a smaller hoe, gingival margin trimmers or chisels. The gingival wall is planed to form sharp interior angles, and as the lingual wall is approached a sweeping curve is made in the outline form of the cavity. The labiogingival angle and the labial wall are prepared with the side of the cutting instrument. In some instances it may be necessary to use the cutting edge to plane the walls. In the preparation of the incisal portion with the cutting edge and side of the instrument, a wall is formed which will be slightly obtuse to the axial wall of the cavity. Gingival margin trimmers may be used to plane the margins of the cavity. The point of the cutting edge is placed toward the axial wall, and the enamel is lightly planed to the proper angle (Fig. 1).

Matrix Impression of Cavity

To form the matrix impression of the cavity, a piece of platinum foil 0.001 of an inch thick is cut to a size that will permit 2 or 3 mm. excess over the cavity margins. The platinum is placed over the cavity, with the gingival portion spanning the interproximal space to the approximating tooth, with about 2 mm. lapping over the lingual margin. A small piece of spunk is placed on the platinum in the linguo-axio-gingival angle. The platinum is drawn into the cavity by very light mallet blows on an orangewood stick placed against the piece of spunk. The force of the blows is increased as the platinum settles into place. A small piece of spunk is placed in the labio-axio-gingival angle. The platinum is drawn into this angle and then into the incisal angle in a similar manner. The platinum is bent over the margins of the cavity onto the surface of the tooth by means of an orangewood stick. The spunk is removed and the platinum is lifted from the cavity. The platinum is trimmed to within about 1 mm. of the lingual margin and 2.5 mm. of the labial margin. It is annealed by being placed in a blowtorch flame or in the electric furnace to bring it to a temperature of more than 2,000 F.

Fig. 1.—Left: Labial view of cavity preparation, showing outline form harmonizing with the lobe of the tooth in which the cavity lies. Right: Interior view of cavity preparation, showing sharp line angles and continuous curve in the outline of the cavity

The platinum is replaced in the cavity, and a large piece of spunk is forced against the platinum, being driven to place by means of an orangewood stick and mallet force. The exposed platinum is smoothed with an orangewood stick against all surfaces of the tooth, including the gingival surface. The spunk is removed, and a strip of rubber-dam is placed over the platinum and under the labial bow of the separator. The platinum is burnished into the cavity against the gingival, lingual, labial and incisal walls by means of a right angle metal burnisher. Holes are worn through the rubber-dam, and the burnishing is done directly against the platinum over the enamel margin (Fig. 2). The platinum is removed, trimmed if necessary and annealed.

The platinum is replaced in the cavity,

and small pieces of gum camphor are pressed into the matrix. Burnishing is accomplished against the gum camphor over the margins to form the platinum cavosurface margins below the surface of the tooth. It is necessary to burnish the angles which the platinum forms below the cavity margin, instead of above it, to prevent the finished filling from being above the margin of the cavity.

Inlay wax is flowed over the labial portion of the matrix and gum camphor. The roughened point of a pin is heated and inserted into the wax (Fig. 3, left). To remove the matrix, the head of the pin is held firmly and the matrix is drawn in the line of least resistance. The separator is removed, and the cavity is filled with temporary stopping. The matrix is held over a fire-clay slab in front of the furnace and allowed to drop off the pin. The matrix is placed in the furnace at a temperature of more than 2,000 F., and the inlay wax and gum camphor are completely burned out. The matrix is removed from the furnace, and the platinum is lifted from the slab, the gingival overlap being grasped with pointed lock pliers (Fig. 3, right).

Baking of Inlay

High fusing porcelain is used for the first three bakes, and a mixture of three-fourths high fusing and one-fourth medium fusing porcelains is used for the fourth bake. When these porcelains are placed in the matrix, the depth of color and shading which is desired in the finished inlay must be kept in mind.

To start the baking, a thin mixture of porcelain and water is placed in the angles of the matrix and vibrated lightly until there is a glazed-like appearance. The first bake is carried to a low fusing point, known as a low biscuit bake. About the same amount of porcelain is placed in the angles of the matrix for the second bake, vibrated to place and brought to a low medium biscuit bake. The third bake will almost fill the matrix

Fig. 2.—Left: Labiodistal view of matrix, showing adaptation. Right: Linguodistal view of matrix, showing minimum extension over lingual margin

when the porcelain is wet, and, after the vibrating, the surface will be slightly concave. This porcelain is then brought to a medium biscuit bake. The fourth bake will complete the contour, and the porcelain will be fused to a high biscuit bake.

The final bake is made by mixing three-fourths medium fusing and one-fourth low fusing porcelains, plus a minute amount of fluxing agent known as super-glaze. This bake brings out the full contour of the inlay, and the inlay is brought to a glaze consistent with the surface of the tooth into which it is to be inserted.

The platinum is stripped from the inlay by being pulled from the margins toward the center of the inlay. The axial surface of the inlay is ground slightly and then undercut with a knife-edge stone toward the labial and lingual surfaces. The internal labial, lingual and gingival surfaces of the inlay are grooved with the same stone. The inlay then is brushed and washed to remove any particles of ground porcelain.

Placement of Inlay in Cavity

To secure the best results, utmost care must be used in setting the inlay. Mi-

Fig. 3.—Left: Labiodistal view of matrix with gum camphor pressed to place and pin inserted into wax for easy removal of matrix from the cavity. Right: Method of holding the matrix by grasping the gingival overlap with lock pliers

crometer tests have proved that it is impossible to seat an inlay into a cavity with cement as deeply as it could be placed without this intermediary between the inlay and the cavity. Everything shoud be in readiness and a definite procedure should be followed.

The temporary stopping is removed, and the enamel margins of the cavity are scrubbed with a mixture of hydrogen peroxide and flour of pumice on a pellet of cotton until all traces of any deposit have been dispelled. The cavity is rinsed and dried with a pellet of cotton. The inlay is placed in the cavity, and the adaptation, contour and color of the inlay are observed. If separation is required, the teeth should be held apart at the incisal edge with a large wedge-shaped orangewood stick or the separator should be applied. After the inlay is removed it should be washed preparatory to setting.

When the inlay is to be cemented into the cavity, the slab, spatula and instrument should be cooled to a proper temperature.

The rubber-dam is placed on the tooth in which the inlay is to be inserted and on at least one tooth mesial to and one distal to this tooth. The cavity is sponged with lukewarm water and dried with cotton. A groove is made along all line and point angles in the cavity with a small inverted cone bur and suitable cutting instruments. A moist pellet of cotton is placed in the cavity and removed just before insertion of the cement. The teeth are separated if necessary with either the orangewood stick or the mechanical separator. The inlay is held between the first finger and thumb, in proper position to be placed in the cavity. The cement is mixed rather quickly to a thin consistency, a small amount is placed immediately on the inlay and the cavity is filled from the labial margin lingually. The inlay is grasped with a pair of pliers, placed in position and floated into the cavity with the aid of an explorer. To force all excess cement from beneath the inlay, a piece of dental floss is pulled back and forth over the inlay and moved in all directions. Then a tapered orangewood stick is wedged between the inlay and the proximating tooth to hold the inlay in position, and this pressure is retained for at least five minutes. The orangewood stick is withdrawn, and cocoa butter is placed over the completed filling. The excess cement is removed, and cocoa butter is applied on the margins before the rubber-dam is removed.—*533 Medical and Dental Building.*

ORAL AND DENTAL MEDICINE IN MEDICAL SCHOOLS AND HOSPITALS

Arthur W. Chance, D.D.S., M.D., Portland, Ore.

It is on record that, in 1839, certain highly respected dentists of Baltimore, wishing to further their usefulness in contributing to the health and welfare of their patients, sought entrance to lectures in the Medical School of the University of Maryland. Permission was refused. The motives which inspired the request and its rejection resulted in the creation of the first dental school in the world.

For nearly a century thereafter medical schools left to dental schools all education which had to do with the oral cavity. Dental schools and dentists were, in turn, concerned more with the mechanics of tooth repair and replacement than with the biology of dental and oral health and disease. Thus the gap between medicine and dentistry widened, to the detriment and suffering of the sick and the injured. The solution of such a condition would seem to lie in imparting a common knowledge in the education of both physicians and dentists.

The wave of extractions that followed the promulgation of the theory of focal infection, attributable in large part to the uninformed opinions of internists, orthopedic surgeons and others, forcibly brought out the need for better understanding between dentists and physicians and surgeons. This was emphasized further by experiences during World War I which showed the need for greater cooperation between the professions. No dentist then in practice will forget the impetus given this idea of cooperation by W. J. Mayo when he spoke of dentists as "Guardians of Public Health."

In 1924, with these facts in mind and with the purpose of training undergraduate medical students to avoid the errors of medical practitioners, the University of Oregon Medical School established a lectureship in oral pathology and hygiene. Attendance on the course was required of junior students, and certain credits toward graduation were given. In 1930, a Division of Dental Medicine was created. It is believed that the designation "dental medicine" as used in study clubs and seminars originated from this action. The head of the division was given the rank of associate clinical professor of dental medicine.

Equipment and Staff

Clinical teaching of medical students at the University of Oregon is conducted in two hospitals and an outpatient clinic. The hospital for adult medical and surgical patients (Multnomah) and a children's hospital (Doernbecher) are connected physically with the outpatient clinic, which is built between them. The Department of Clinical Medicine uses forty rooms for examination and diagnosis by clinical instructors and medical students. Immediately adjoining these rooms, four rooms were assigned to the Division of Dental Medicine and were designated "Dental Medicine Clinic." The clinic was equipped with three operating chairs, a special x-ray unit and all other equipment necessary for the treatment of outpatients and of ambu-

Clinical professor, Division of Oral and Dental Medicine, University of Oregon Medical School.

latory and stretcher patients in the hospitals. Later, a third hospital for tuberculous patients who required surgical treatment was built on the medical school campus and rooms were equipped for complete dental service to these patients within the hospital itself, under the direction of the Division of Dental Medicine.

An intern in dental medicine was authorized and appointed, beginning service in July for a period of one year. With the exception of three years during World War II, interns have served continuously since 1930. The intern has quarters in the hospital and in every respect is on complete equality with the other interns.

A visiting staff of practicing dentists of the city was formed. In 1930 the staff was composed of seven dentists. At present it is composed of twenty, and four or five are soon to be added. Hospital rounds by dental staff members are made regularly. These consist of examination of all patients in the Multnomah Hospital and the Doernbecher Memorial Hospital for Children who are not so ill as to prohibit oral examinations. The head of the division was given full control over the subject matter of dental lectures for the medical students, the appointment of members of the dental staff and, in consultation with them, the direction of the services of the intern and the choice of subjects for research. He is chief of dental consultants to the medical and surgical staffs of the hospitals.

Authority for this expansion of dental service in the medical school and associated hospitals was granted by the Board of Higher Education of Oregon on the recommendation of the dean of the medical school.

Objectives

Three objectives, expressed by the dean, were expected to be attained through the creation of a separate division or department of dental medicine in the medical school and hospitals. These were: (1) teaching medical students the importance of oral conditions in the study, diagnosis and treatment of general disease, (2) instituting research in problems common to medicine and dentistry and (3) providing dental service for patients in the hospitals and the outpatient clinic, particularly in connection with illness and injury.

In instituting this medical school and hospital program it immediately became apparent that, in addition, a fourth activity was urgently necessary. This was the education of members of the dental staff themselves in medical, surgical and laboratory diagnostic procedures and terminology.

In the report of the Curriculum Survey Committee of the American Association of Dental Schools (1935), it was gratifying to read the recommendation to dental school authorities that these objectives, which our dental group has held throughout seventeen years, should be incorporated into the curriculum of dental schools. It is even more gratifying to learn that the programs of the University of Oregon Medical School and associated outpatient clinic and hospitals are identical with those prescribed for accreditation of hospitals and hospital dental internships by the Hospital Dental Service Committee of the American Dental Association.

Staff Activities

The University of Oregon Medical School, having no endowment funds and depending largely on state tax support, has had to rely on many volunteer instructors whose loyalty and devotion to medical education and to the school has produced a fine quality of physicians and surgeons over a great number of years. It has produced outstanding results in research, some of which are known throughout the world. The same devotion and loyalty have characterized

the members of the dental medicine staff. No member, including the head of the division, ever has received financial compensation.

The division began as a strictly voluntary enterprise and, at the outset, was on probation. For seventeen years it has proved its worth to the medical school, hospital staffs and patients alike. This was recognized within a very few years by the Board of Higher Education, which made the division an integral part of the medical school to be maintained by state funds as are all other departments of the medical school.

An activity indispensable in producing this result came from the willingness of the members of the staff during the first year and for several succeeding years to engage in a program of medical, surgical and medicodental study. The staff employed physicians, surgeons and specialists to conduct lecture classes, demonstrations and clinics, each member of the staff being assessed for payment. Because the need was urgent, classes were held twice each week, sometimes at the medical school or in one of the hospitals, sometimes at five o'clock in the afternoon near the offices of the members. Over a period of years, three hundred and fifty hours of such lectures, demonstrations and clinics were held.

The subjects discussed included embryology, general histology and pathology, hematology, biochemistry, nutrition and vitamin therapy, endocrinology, cardiovascular disease, urology, physical diagnosis and clinical medicine, syphilitic and other specific lesions, acute and chronic new growths, diabetes, and lymphatic drainage of head and neck. Attendance by members of the staff and by the intern was compulsory.

During the war, lectures, clinics and demonstrations were discontinued, but they are again in progress to provide review for the older members and instruction for the less experienced members. Because of the accelerated training program, lectures to medical students also were discontinued, and the dental medicine clinic was operated but twice each week. There was no intern, and clinic and hospital work was carried on by staff members.

For many years there was little cooperation between the medical school and the local dental school, the latter being under private ownership. Within recent years the dental school has come under state ownership with resultant improvement in relations. The dental staff in the medical school has accepted the responsibility of providing some hospital training for the senior dental students. The students make hospital rounds and attend the dental medicine clinic in groups of four under the direction of staff members. The dean of the dental school has become a member of the dental medicine staff of the medical school. With resumption of the full program, the title of the division has been changed to that of "Oral and Dental Medicine," and the head of the division has been raised in rank to clinical professor.

Since the dental school became a unit of the University of Oregon in the system of higher education, the dean and faculty of the medical school have counselled with the dean and faculty of the dental school in planning the basic science departments and other curricular programs. Although the schools have autonomy with respect to budgets and personnel, several faculty members hold appointments from both. The dental student health service is conducted by a member of the medical school staff.

It is now proposed to inaugurate a postgraduate course in children's dentistry. This will include a rotating program divided into four periods of three months each, as follows: (1) in the dental school, (2) in the medical school and hospitals, (3) with the division of oral health of the State Board of Health and (4) with the unit devoted to clinical research. Children from the Doernbecher

Memorial Hospital for Children and from the outpatient clinic who are in need of restorative and reconstructive dental service will serve for clinical instruction.

These recent activities have been summarized by the dean of the dental school as follows:

> The material contribution to the educational experience of the dental student, and real cooperation between the medical and dental faculty members experienced in the first two years of association, gives substantiation to our belief in this philosophy of professional training. With this encouragement the dental school looks forward to the time when it will join the medical school on the medical school campus and when both institutions will, through more intimate contact, better accomplish their objectives in fields which are closely related though not identical.

Work of the Clinic

Early in the history of the division of dental medicine, a survey of the records of 3,600 patients of the clinic showed that 1,800 of them had had a differential diagnosis of disease before being referred to the clinic. The other 1,800 were referred as part of a general physical examination to determine the cause of illness.

It is a strict regulation that no patient is to be referred to the dental medicine clinic or seen in the hospital without the record of his physical and clinical examinations.

Examinations of patients and records are made in the following sequence: (1) chief complaint, present illness, history, differential diagnosis, serology, hematology, temperature and pulse, blood pressure, previous operations and other special conditions, (2) examination by instrumentation of mouth and associated parts, (3) examination of roentgenograms, if supplied, and (4) order for roentgenograms, if required, and subsequent examination of them.

Although the clinic is not one of original entry, and patients ordinarily are referred from other departments and divisions, exceptions are made in instances of Vincent's infection or fractures. Before World War II, the clinic treated as many as fifty fractures of the mandible and maxilla in a single year.

Several research projects have been undertaken during the years of the division's existence, with participation by the departments of bacteriology and biochemistry. A number of reports of this work have been published in THE JOURNAL.

Benefits to Staff

It has been said that in few, if any, medical schools or hospitals has a group of dentists better standing than has the dental medicine staff in the University of Oregon Medical School and hospitals. It would be difficult to conceive, also, of greater reciprocal exchange of information and opinions in the treatment of patients. It is believed that this is the result of recognizing the limits of the fields in which the division operates and meticulously observing the scope of other departments even though overlapping might exist.

This seventeen year program of medical, surgical and dental cooperation has raised the standards of dental practice not only in Portland but in all of Oregon and the Pacific Northwest. It has increased the ability and raised the standards of the members of the staff in their private practices by enabling them to consider the patient as a whole rather than from the standpoint of the mouth only. This has resulted in the ability to exercise better judgment in advising technical procedures which may influence potential disease or serve to eliminate present illness.

Possibilities for Similar Programs

Similar hospital participation may be undertaken and similar results can be

obtained wherever a hospital exists, even in the absence of a medical school. The situation lies in the hands of individual dentists or local dental societies. Individual dentists or committees of local dental societies can meet with individual physicians or committees of local medical societies to outline programs for hospital participation by dentists. Such programs need not, and should not, be limited to the extraction of teeth, for it has been said that "the extraction of teeth for the cure of disease will sometimes do no more than cure the belief that the extraction of teeth will cure all disease." Dentists who are in practice and who have not had the benefit of recent improvements in dental education can compensate for this by engaging lecturers and clinicians, as was done in the Division of Oral and Dental Medicine. Then by entering into hospital service, full cooperation with medical, surgical and health groups will result.

Such a course of action is highly recommended to individuals and groups who sincerely want to improve themselves, elevate the profession of dentistry and assist in public health. No other activity offers the same opportunity to implement the profession in its role of "Guardians of Public Health," or to justify the claim that dentistry is one of the healing arts.—*Medical Dental Building.*

POSTGRADUATE EDUCATION IN THE UNITED STATES NAVAL DENTAL SCHOOL

Clemens V. Rault, D.D.S., M.S.D., Bethesda, Md.

The Naval Dental School was organized in 1922 for the purpose of giving postgraduate instruction in dentistry and in the collateral duties dental officers are called on to perform in the naval service. The United States Navy is the property of the citizens of this country, and the Naval Dental School, which is obviously a part of the Navy, should be of particular concern to all.

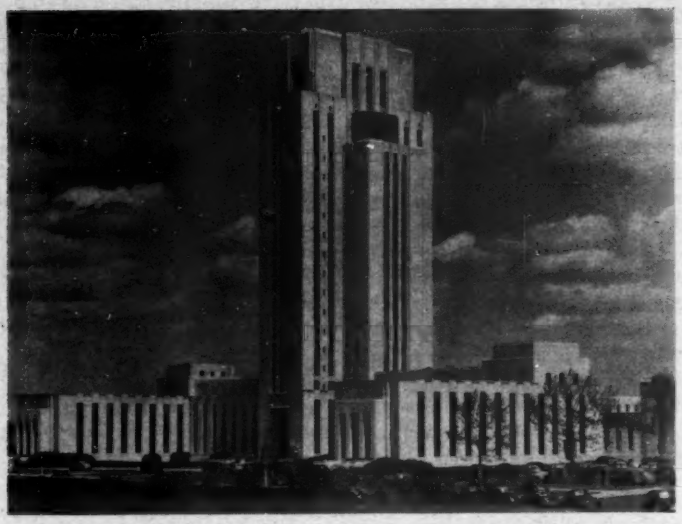
At the Naval Dental School in Bethesda (see illustration) two types of postgraduate instruction are conducted; namely, (1) advanced courses, with immediate application to dental service of the Navy, and (2) instruction to prepare selected students for research in dentistry.

Of importance is the fact that the Naval Dental School is under the direction of dental officers. This is as it should be, for the instruction is for dental personnel. Who is better qualified than dentists to determine what and how dental matters should be taught?

Dental Postgraduate Courses

The postgraduate courses now available to dental officers are (1) basic indoctrinational course, (2) general postgraduate course, (3) oral surgery, (4) prosthodontia, (5) maxillofacial and ocular prosthesis, (6) periodontia and oral pathology, and (7) operative dentistry.

Read at the eighty-eighth session of the American Dental Association, Boston, August 6, 1947.
Captain, Dental Corps, U.S.N.



U. S. National Naval Medical Center. The wing on the left is occupied by the Naval Dental School. The Naval Hospital is in the central portion, and the Naval Medical School is in the right wing

The basic indoctrinational course is for newly commissioned officers; the other courses represent review, new developments and specialization for men who have been in the Dental Corps for five to ten years. Two groups of about 25, or a total of about 50 officers, each year are admitted. These are six months' courses. Each course consists of 914 hours of instruction divided as shown in the table.

The following subjects are included in all of the courses:

Medico-Dental Sciences.—Oral pathology, oral bacteriology, biochemistry and nutrition, hematology, tropical medicine, dermatology and syphilology, and anesthesia and pharmacology.

The oral pathology division of the school assumed greater prominence and importance with the assignment last year of a full time instructor to build up the library of pathology slides and other teaching aids and materials. Didactic hours and laboratory assignments were tripled, to provide a more comprehensive course of instruction for postgraduate officers.

Oral Medicine.—Oral diagnosis and treatment planning, roentgenology, periodontia and public health dentistry.

Public health dentistry is handled ably by guest lecturers from the National Institute of Health of the U. S. Public Health Service. A series of eight lectures was presented to the postgraduate officers covering the various aspects of current public dental health problems.

Operative Dentisty.—Dental materials, manipulation and research, operative procedures and endodontia.

The testing of dental materials is taught at the National Bureau of Standards.

Oral Surgery.—Maxillofacial surgery, exodontia and minor oral surgery.

Prosthesis.—Crown and bridge prosthesis, partial dentures, full dentures, ocular prosthesis and maxillofacial prosthesis.

Naval Subjects.—Property and accounting, personnel administration, public

speaking, dental research and audio-visual training films.

Special Clinics and Assignments.—Guest speakers, conferences and research projects.

The dental officer who specializes in prosthodontia or in oral surgery attends all of the general lectures in the postgraduate course, but, instead of attending the laboratory and clinic sessions in the general course, he devotes that extra time to work in his specialty. The classroom instruction in all clinical courses is given first; then the officers can be checked in the clinic as to how they apply in practice what they have learned.

Occasionally civilian dental specialists come to the school to conduct courses, and one of the officers of the Naval School is instructing, part time and on an exchange basis, at Georgetown University in Washington.

One afternoon a week (occasionally more often) a leading dental educator or practicing dentist appears before the entire postgraduate school, both instructors and officers in training. A conference may start with a brief case report or two of special interest, with the patients brought in. Then the lecturer delivers his talk, sometimes accompanying it with models, motion pictures or slides, and then the conference is thrown open for questions. Often the discussion is concluded by adjournment to one of the dental operating rooms or laboratories for a demonstration of how the particular procedure under discussion is carried out at the Naval School.

As one contribution to dental education, the Naval School is preparing training motion pictures on the following subjects: root canal technic, periodontia, jacket crown construction, operative dentistry, oral hygiene and hydrocolloid indirect technic. These six films, except the one on oral hygiene, are written at the graduate level. As with other motion pictures the Navy has produced, they will be available to dental schools, societies and study groups generally.

Hours of instruction in various courses in didactic, laboratory and clinic work

Course	Hours of instruction		
	Didactic	Laboratory	Clinic
General postgraduate	388	65	461
Prosthodontia	388	11	515
Oral surgery	316	81	517

Some thought is being given to the advisability of setting up internships, in which six months of postgraduate work at the Naval Dental School would be followed by six months at one of the naval hospitals, where the medico-dental relations rather than the technical aspects of dentistry would be stressed. Exploring this possibility from another direction, a captain in the Medical Corps has been attached to the Dental School for the past year to teach pathology and to bridge the gap between medicine and dentistry.

A pilot step in this direction has been an "observership" at Memorial Hospital for the Treatment of Cancer and Allied Diseases, New York,—primarily for our instructors and postgraduate specialists in oral surgery. Our first instructor under this arrangement spent three months in the head and neck department of that hospital, through the cooperation of the head of that department, Dr. Hayes E. Martin.

This instructor's mission was not only to learn diagnosis of cancer of the mouth but also to set a pattern for the men who would succeed him, and to assemble teaching materials for use in our own school. We now are able before sending an officer to Memorial Hospital to give him intensive background instruction at Bethesda. He then spends five weeks at Memorial Hospital, with his first week of attendence there overlapping that of

the officer who preceded him. Since recognition of early cancer in dental patients is important so they can be sent immediately to the specialist for surgical operation, this short, intensive observership serves naval dentistry and the patients better than would longer internships for a smaller number of men.

Nonprofessional Courses

Dental technicians do not come into the Navy already skilled. Therefore, Navy dental officers must train their own nonprofessional assistants, and for this purpose the following courses are taught at the Naval Dental School:

Dental Technology (General). — Subjects included in this course are histology, pathology, anatomy, roentgenography, dental materials, oral hygiene, materia medica, odontography, bacteriology, oral surgical procedures, property and accounting, forms and clerical procedures and typing.

Last year, 136 hospital corpsmen received certificates in this specialty at the school, and 46 corpsmen are under instruction at present. The course is of ten weeks' duration, with a class graduating every five weeks.

Dental Technology (Prosthetic). — This course includes some of the subjects given to dental technologists (general) but consists mainly of laboratory study and practical application in the construction of full dentures, partial dentures, crowns and bridges.

Fifteen students were graduated in this specialty during the past year, and 41 corpsmen are at present under instruction. The course is of six months' duration. The students then are sent to our large prosthetic laboratories where practical instruction is continued.

For the Prosthetic Laboratory School a series of twelve slide films is being made. They will cover the laboratory steps in making full and partial dentures, from model making through finishing and polishing. One of the twelve films will be on repair and reconstruction of dentures. Like the motion pictures previously mentioned, these slide films will be available to the profession generally.

Dental Repairman. —This six months' course, leading to a certificate as dental repairman, includes the study and repair of the various pieces of equipment used by the dental department of the Navy. Students applying for this course should show aptitude for electrical, machine and lathe work and other mechanical procedures.

During the past year 11 students received certificates in this specialty at the school.

Medico-Dental Science

In examining candidates for commission in the Naval Dental Corps and in observing dental officers who are postgraduate students at the Dental School, it has been found that these men are usually fairly proficient in practical and mechanical subjects basic to proficiency in operative dentistry, crown and bridge prosthesis and prosthodontia, but they are often weak in medico-dental science subjects such as pathology, anesthesia and so forth, and in the dental subjects of oral diagnosis, treatment planning, roentgenology, periodontia, maxillofacial surgery and oral surgery. This brings up the question which faces dentistry everywhere, and which the Naval School considers seriously, of whether a dentist should strive to be just a good technician or to be a competent professional man specializing in teeth and surrounding structures and the effect of defects and disease in these regions on the health of the patient.

Officers who are assigned for postgraduate instruction at Bethesda usually are inclined at first to think that they remember the basic subjects. One of the instructors thought that these officers would learn more if they approached his course in a slightly different frame of mind. So, on the first day of his class,

after a few general introductory remarks, he gave a written examination. Although the questions were not particularly difficult, the men quickly were impressed with the need for review. Other instructors tried the idea on their classes, with such results that now this is a standard practice for the first day of all courses. For a different reason, it has also been found valuable to open each lecture period with a short examination on the day's subject.

This procedure is stimulating and results in the officers' being more intelligently and constructively critical of their courses and instructors. At the close of the six months' work, they are required to submit an anonymous appraisal of the course. This has been good for both the dental officers and the school.

Certification for Specialties

The only thing I might say about certification for specialties is that the Naval School is interested in whatever the Council on Dental Education of the American Dental Association develops. Any course taught in the postgraduate school, for which specialization standards are set up, will be planned so that dental officers looking forward to certification can qualify.

Naval Dental Corps

The Naval Dental Corps wants more well qualified young dentists to realize the opportunities it presents for the practice of good dentistry, with professional and economic security from the start, and with retirement pay that exceeds the amount most dentists can set aside from a good civilian practice. One may retire after only twenty years of service if he wishes.

Research

The high command of the Navy is interested especially in postgraduate training and education for research. To me, that is the most important single element in the conduct of our school work; instead of having to justify every advance step, facilities, funds and the order have been given to conduct a comprehensive postgraduate training and research program in dentistry. This can result only in better dental service to naval personnel and will surely be to the ultimate profit of the citizens of this country.—*Naval Dental School, National Naval Medical Center.*

TOOTH MUTILATIONS IN PRE-COLUMBIAN MEXICO

Samuel Fastlicht,* Mexico City, Mexico

HUMAN beings, from the most primitive to the most civilized, have always shown a tendency to embellish themselves by deforming or changing the characteristics of their bodies. As examples may be cited tegumentary changes such as tattooing and body painting; the cranial deformation practiced in many places, including the Americas; the deformation of the feet, characteristic of China; and a practice of the most primitive tribes, perforation of the nose, lips

*Cirujano dentista.

Read at the eighty-eighth annual meeting of the American Dental Association, Boston, August 4-8, 1947.

and ear lobes. Perforation of the ear lobes is still being done by the most refined women of our time. In this connection it is interesting to note the great variety of rings, pendant earrings, nose rings and under lip rings known in Mexico and used by the pre-Hispanic inhabitants. These articles, worked in rock crystal, obsidian, gold and jadeite, were executed with a skill never equalled or surpassed, as is shown by the rich collections which may be seen in the museums of Mexico.

Another of the intentional mutilations performed for decorative purposes was tooth mutilation, which consisted of filing and making inlays in the teeth. Dyeing of the teeth also was practiced.

This study will be limited to the tooth mutilations practiced among the pre-Hispanic natives who lived in the territory which is today the Republic of Mexico. That this work was performed on persons outstanding in social, political and religious life is demonstrated by the finds made in certain tombs in which such work is associated with objects of great significance and extraordinary beauty.

The practice of medicine, surgery and dentistry was perhaps intimately linked with the decorative work of tooth mutilation, inasmuch as those who devoted themselves to such practices possibly were priests, indigenous doctors, witches and medicine men. It should be noted that the dental filing and inlays were made for decorative or ritual purposes and in no manner for therapeutic reasons. Nevertheless, it is only fair to acknowledge that the aboriginal groups which inhabited the country were acquainted with therapeutics and medicine. Their chroniclers have described the broad knowledge that the natives had of the therapeutic properties of medicinal herbs. This fact is confirmed by the recently discovered Badianus Manuscript,[1] a work dealing particularly with Mexican medicine and written in 1552 by Martínez de la Cruz (Fig. 1). The author of the text of the herbarium was a professor of native medicine, and Badianus, who made the translation from Aztec to Latin, was a Latin reader. In this work, marvelously illustrated in color, suggestions are given for the proper herbs for the treatment of decayed teeth and diseases of the gums and the "cure of swollen faces and abscessed teeth."[1]

Neither was dental hygiene unknown to them, for the Badianus Manuscript contains certain references to the use of ashes as a fine abrasive. The ashes were mixed with honey and were applied to the teeth, and the teeth were then polished with a cloth.

The chronicler considered the most important source is Fray Bernardino de Sahagún, who reached Mexico in 1529. His manuscript,[2] which also deals with native medicine and dental ailments, was written about the year 1570, in the Santa Cruz College at Tlaltelolco. Sahagún secured directly from the outstanding natives information covering the customs and cultural features of the inhabitants of pre-Hispanic Mexico. There are various chroniclers[3] and doctors[4-6] who, having been sent out by the Spanish sovereigns, devoted themselves to studying cultural characteristics and the medicinal properties of the herbs which the doctors, principally Aztecs, used in the treatment of disease. They likewise investigated their knowledge of surgery.[7]

The material placed at my disposition

1. Emmart, Emily W., *The Badianus Manuscript: An Aztec Herbal of 1552*. Baltimore: Johns Hopkins Press, 1940.

2. Sahagún, Fray Bernardino de, *Historia General de las Cosas de Nueva España* (written about 1570). Editorial Pedro Robredo, Mexico, 1938.

3. Landa, Fray Diego de, *Relación de las Cosas de Yucatán* (written about 1566). Editorial Pedro Robredo, Mexico, 1938.

4. Hernández, Francisco, *Cuatro Libros de la Naturaleza y Virtudes Medicinales de las Plantas y Animales de la Nueva España*. Annotated, translated and published in Mexico in 1615, by Fray Francisco Jiménez.

5. Cárdenas, Juan de, *Primera Parte de los Problemas y Secretos Maravillosos de las Indias*. Pedro Ocharte, Mexico, 1590.

6. Farfán, Augustín, *Tratado Breve de Cirugía y del Conocimiento y Cura de Algunas Enfermedades que en esta Tierra más comunmente suelen haber*. Antonio Ricardo, Mexico, 1579.

7. Ocaranza, Fernando, *Historia de la Medicina en México*. Midy Press, 1934.

for this study belongs to the National Museum of Anthropology of Mexico. I wish to acknowledge the valuable cooperation and advice of Dr. Alfonso Caso; of Dr. Daniel R. de la Borbolla, director of the National Museum of Anthropology of Mexico, and especially of Dr. Javier Romero, head of the Department of Anthropology, National Museum, Mexico.

The material studied consists of approximately 250 teeth, some of which are separate specimens and others of which still remain in the alveolar bones. I also have studied one Maya specimen from Jaina, Campeche, which belongs to my private collection.

Fortunately it has been possible to classify a certain number of these teeth in accordance with the archaeologic period corresponding to the associated ceramics in the burials as well as in the tombs. It is known, therefore, that these dental specimens come from the three great cultural periods of the Central Plateau. The first of these began several centuries before Christ, and the last period ends in the early part of the sixteenth century, at the time of the conquest of Mexico.

This cultural succession is of prime importance inasmuch as it serves as a basis for chronologically locating the finds made in other localities of Mexico. To illustrate, the three periods of cultural development which have already been mentioned, as well as their approximate chronology, are as follows: Archaic, 200 B.C. (example: Xalostoc, Federal District); Teotihuacán, 400-1000 A.D. (example: Teotihuacán), and Aztec, 1500 A.D. (example: Cholula).

The archaeologic zones in which mutilated teeth have been found up to the present time are as follows: Monte Albán, Oaxaca; Teotihuacán, Mexico; Tzintzuntzan, Michoacán; Cholula, Puebla; Mitla, Oaxaca; Palenque, Chiapas; Tecolpan, Tabasco; Jaina, Campeche; Cerro de las Mesas, Veracruz; Xochicalco, Morelos; Xalostoc and Arbolillo, Federal District, and Yucatán.

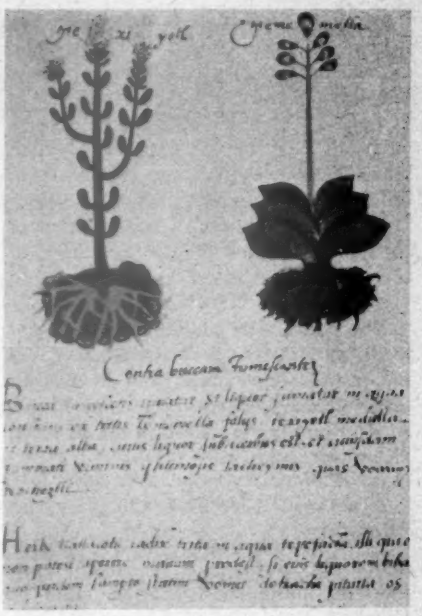


Fig. 1.—Plate 38 of the Badianus Manuscript, written in 1552 and found in the Vatican Library in 1931, illustrating the pictorial technic of the Mexican Indians and the medicinal herbs which they used to treat swollen cheeks

Classification

In accordance with Borbolla's[8] classification table (Fig. 2), there exist at the present time twenty-six types of dental mutilation, which for this study shall be divided into three principal groups: (1) filing of the incisal edge, (2) filing of the vestibular surface and (3) inlays.

Group 1 comprises filings composed of one, two or three grooves or the cutting of one or both incisal angles either in straight or concave form (types A, B, C, D, I, J, K, L, M, N, O) (Fig. 3, left).

8. Borbolla, Daniel Rubín de la, Types of Tooth Mutilations Found in Mexico. *Am. J. Phys. Anthropol.* 26:349 (March 30) 1940.

Group 2 consists of mutilations in which two, three or four very superficial grooves are made in the enamel. These may be horizontal, oblique or both (types E, F, G, H, Y, Z) (Fig. 3, center).

Group 3 covers circular inlays, which may be composed of one, two or three inlays (types P, Q, R, S) (Fig. 3, right).

In some specimens, a combination of the characteristics of two or three of the above mentioned groups is found (types T, U, V, W, X).

The filings were made in the six front teeth, the upper as well as the lower, but the inlays were made only in the six upper teeth. Only in 1 case, in Monte Albán, were inlays placed in the first and second bicuspids.

Technics

Some persons have supposed that the dental decorations were made post-mortem, inasmuch as Ranke, cited by Dembo,[9] stated that, in the case of inlays, "these were made only after death, perhaps as a cadaveric ornament."

Hamy[10] also doubted that the inlays were made on the living. In referring to the laborious and painful process required for the drilling of the tooth for the inlay, he said that "only in an exceptional case could an operation so prolonged be successfully practiced on a living person."

Nevertheless, chroniclers as authentic as Sahagún[2] and Landa[3] confined themselves simply to mentioning dental decorative mutilation, and although they did not describe the technic or the instruments used, at least they observed that the teeth were filed and painted for the purpose of embellishing them. Sahagún[2] (p. 132) said that "they (the Huastecs) have their noses pierced and they stretch them with palm leaves, and in the hole in their noses they put a gold tube and they purposely filed their teeth, and dyed them black and other colors." In Yuca-

9. Dembo, Adolfo e Imbelloni, J., *Deformaciones Intencionales del Cuerpo Humano de Carácter Etnico*. Buenos Aires, 1938.

10. Hamy, E. T., Les Mutilations Dentaires au Mexique et dans le Yucatan. *Bull. Soc. Anthropol.*, Paris, Third Series V, 879-887, 1882.

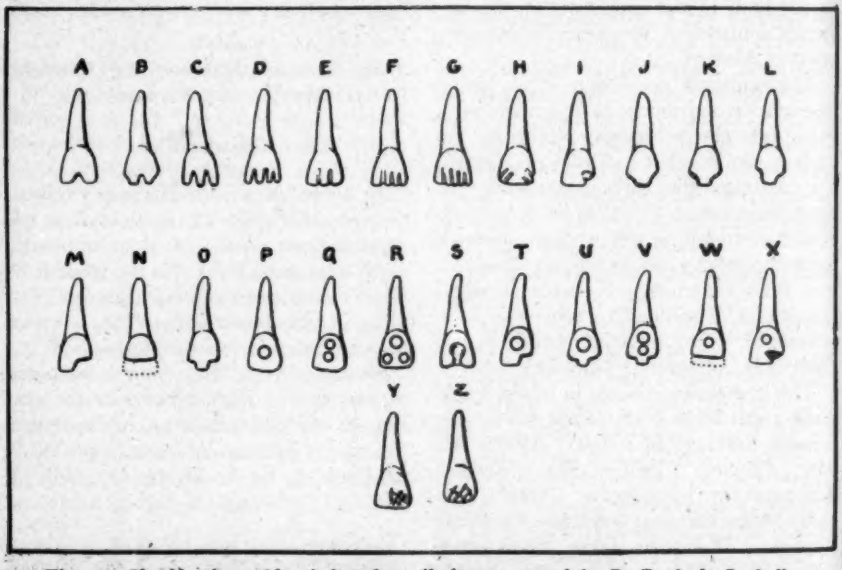


Fig. 2.—Classification table of dental mutilations prepared by D. R. de la Borbolla

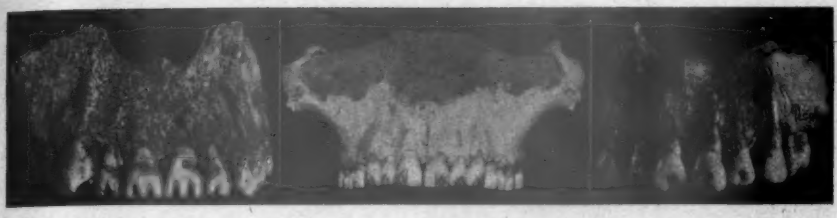


Fig. 3.—Left: Dental filings, specimen from Tzintzuntzan, Michoacán (Tarascan culture). Center: Dental filings of the maxilla, from Xalostoc, Federal District (Archaic culture). Right: Teeth with cavities for inlays, from Tecolpan, Tabasco (Maya culture)

tán one of the most authentic and reliable chroniclers, Bishop Landa,[3] who arrived in the Peninsula in the year 1549, in speaking of the Yucatecan Indians, said (p. 133): "It was their custom to cut the teeth, leaving them like the teeth of a saw, and they considered this elegant, and some old women performed this task, filing the teeth with certain stones and water."

The reason that the chroniclers do not mention how the inlays were made, but speak only of the filing, is that the inlays were made among aboriginal groups whose culture had almost disappeared at the time of the arrival of the Spaniards. For example, the Maya zone and, farther north, the zone of Monte Albán already were almost in ruins or decadent at the time of the conquest.

Those who have devoted themselves in the last few years to the study of tooth mutilations (Borbolla[8] and Linné[11]) agree that the best inlays were made by the Maya. The inlays have been found in tombs geographically related to the Maya culture.

The most convincing evidence that the mutilations were made during life are the imperfections in the preparations which produced disorders such as the degeneration of the pulp and, as a consequence, a periapical alveolar abscess. The roentgenogram in Figure 4 shows that the abscess is round in form and precisely defined so that it cannot be confused with an accidental postmortem destruction.

Other specimens show that the teeth were filed to an extreme depth so that they practically could not be used because of their probable sensitivity to thermal changes, for in some of the filings great portions of the dental tissue were cut down (Fig. 5). Also the fact that the opposing teeth showed the formation of tartar on the vestibular as well as the lingual surface indicates that once the teeth were filed they were little used from the physiologic point of view.

When we consider how painful dental drilling is now in spite of the advances of science with respect to anesthesia and modern instruments, we cannot help but think how much those people must have suffered from the filing and dental preparations which were performed at that time as a simple decoration with only rudimentary instruments.

There are references with respect to the use by the natives of Oaxaca of a certain wild mushroom as an anesthetic,[11] and in Peru the narcotic and stimulating properties of the coca leaf have been known for a long time.

In Mexico the filing and other mutilations were done with stone,[3] a fact which can be easily established by study with a magnifying glass of some filings which are not perfect. Dembo,[9] referring to experiments made by Miller, described filings made by "cutting plates of silex

11. Linné, S., *Zapotecan Antiquities and the Paulson Collection in the Ethnographical Museum of Sweden.* Stockholm, 1938.

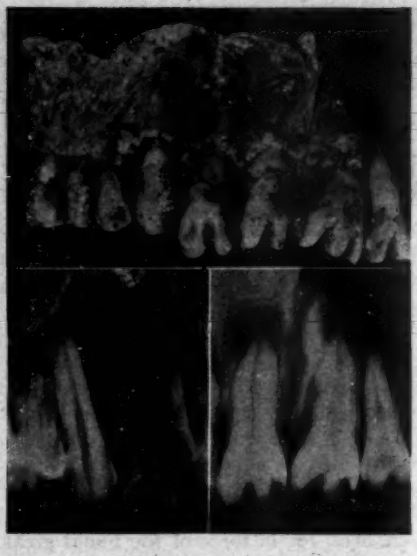


Fig. 4.—Above: Maxilla with filings, from Cerro de las Mesas, Veracruz (culture related to Monte Albán I). Below: Roentgenograms of same specimen. The periapical abscesses can be seen in the two central teeth; the pulp chamber was not yet well calcified and the filing injured the pulp

which produced oblique and vertical incisions."

With respect to the technic used for the preparation of the cavities which were to receive the inlays, I am of the opinion that the same type of drill was used as that utilized to make circular holes in the beads of necklaces and in stone masks. Toward the end of the pre-Columbian period, a copper tube[2] might very well have been used with the aid of an abrasive powder or perhaps, in much more ancient times, rock crystal.

Referring to the Maya, Morley[12] pointed out: "When we consider that the ancient Maya had not then metal tools, complete mastery of jade-carving is an outstanding technical achievement. . . . Drills of round, hollow bird bones were used for carving circles and segments of circles. . . . They were twirled in the hands, using sand and water as actual cutting agent." Morley added: "Jade has a hardness of from 6.5 to 6.8 in the scale used by geologists to measure the hardness of rocks, the diamond being graded as 10 in this scale."

I have examined jaws in which the inlays are found still in place, as well as specimens with empty cavities from which the inlays have been lost. In some of the empty cavities I found a central projection, convex in shape, which probably served as a point of reference to the operator in his work, both in the perforation and in the setting of the stone drill.

The fact that those teeth provided with inlays had been used for years was indicated by the physiological wear noted in some cases. In other cases, in spite of fractures of the edges of the teeth, the person had continued to use the teeth. In the majority of cases, the mutilation did not extend to injury of the pulp chamber, a finding which confirms the knowledge of dental anatomy possessed by those who devoted themselves to this work of decoration.

Nevertheless some cases were found, few to be sure, in which the dental perforation injured the pulp and in time produced necrosis and a periapical abscess.

Inlays

In Mexico the inlays invariably were circular in form and had a flat or convex surface, but on the Ecuadorian coast the quadrangular variety also was known.

The inlay might have been cemented or put in place by pressure; however, this problem is open to discussion. From the cavities I have studied, I have formed the conviction that the inlays were well adjusted and cemented and that the remnants of a layer of material still observed in some specimens might be con-

12. Morley, S. G., *La Civilización Maya*. Buenos Aires: Fondo de Cultura Económica Mexico, 1947. p. 471.

sidered as a cement similar to modern dental cement. In some cavities the cement is dyed red. The reasons for this may be: (1) the teeth may have been dyed that color; (2) the cavities in question may have belonged to a secondary burial; (3) red may have been the color of the adhesive agent used; (4) associated objects, such as ceramics or wrappings, may have discolored the cement, or (5) red may have been the regular color of the soil of the region. From the perfection of adjustment of the inlays which are found still in the teeth, it may be supposed that in Mexico the inlays were adjusted perfectly and cemented with an adhesive agent still unknown to us, which aided in their complete preservation. If the inlays had not been cemented in but simply had been put in place and adjusted under pressure, the action of the oral secretions would have rapidly destroyed the exposed tissues by caries, particularly in preparations of relative depth.

Age

With respect to the age at which the tooth mutilations were performed, it may be said that, in the case of inlays, most cavities were made in adults,[8] inasmuch as the concavity of the cavities did not injure tissues as delicate as the pulp. In children the pulp occupies a large part of the tooth, and as the person advances in age the pulp goes on calcifying and the size of the pulp chamber is reduced. At an early age any perforation is fatal to the life of the tooth, and in the great majority of the specimens observed the dental pulp has not been injured by the filing or by the preparation of the cavity to receive the inlay. In one upper jaw (originating from Las Mesas, Veracruz) in which the teeth were filed but not to great depth, alveolar abscesses have been noted. The roentgenogram taken of the specimen in Figure 4 reveals that the pulp of the teeth filed fills almost all the tooth and that the filing, although very superficial, was nevertheless sufficient to injure the pulp chamber, producing pulp necrosis and periapical abscesses in the two upper central incisors. This fact indicates that the mutilation was performed on a very young person (12 to 13 years of age), so that it must be admitted that mutilations also were performed on adolescents.

Fig. 5.—Above: Filings of the maxilla, from Xochicalco, Morelos. Note the abscess in the left central incisor, resulting from the injury to the pulp produced by a too deep filing. Below: Roentgenograms of same specimen

Materials Used

Various materials were utilized for inlays in Mexico. The most frequent was hematite (anhydrous sesquioxide of iron) and jadeite (metasilicate of aluminum and sodium, sometimes with minor amounts of iron), although some investigators believe that jade (calcium and magnesium silicate, with a certain iron content—actinolitic jadeite) also was used.

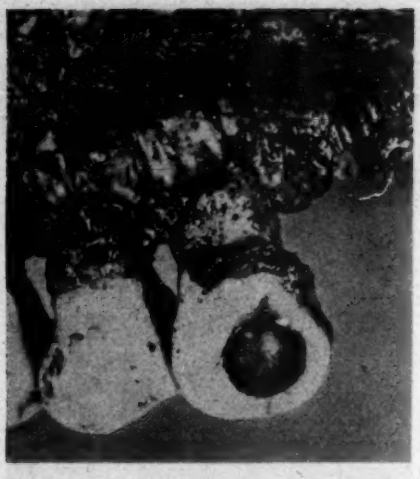


Fig. 6.—Jade inlay, specimen from Teotihuacán, Mexico. Swedish expedition, 1934-1935 (Linné)

In this connection it should be mentioned that there is a difference of opinion as to the existence of jade deposits in Mexico and America in general. However, there are numerous splendid archaeologic objects originating from zones such as Monte Albán, Cerro de las Mesas, Teotihuacán and others which have been classified as being of jade.

According to the Maya authority, Morley,[12] the jade deposits in America have not yet been found. Nevertheless, he mentioned finds of jade in the form of pebbles in the rivers of Middle America, with weights varying from a few grams to ninety kilograms. Morley himself excavated from a tomb in Copán a jade stone weighing several kilograms.

There are references to other materials such as pyrite, turquoise, gold and obsidian.

In 1905 Rojo[13] presented, among various mutilations, teeth with circular inlays of iron pyrite having a diameter of 3 mm. and being very well fitted. Hamy[10] in 1882 found inlays of turquoise in the state of Campeche; Blom[14] referred to the finding of a Maya skull with turquoise inlays in the central and lateral incisors and the upper cuspids; Saville[15] found some teeth with gold plates in Esmeraldas, Ecuador, one 5 mm. and another 3 mm. thick, both with well polished surfaces.

Linné[16] found an upper jaw belonging to a burial discovered in Teotihuacán (Swedish expedition, 1934-1935) which has a jadeite inlay in each cuspid (Fig. 6). According to Linné, the jaw belonged to a person of Maya or Zapotec origin (654 A.D.), who probably made

13. Rojo, J. J., *Historical Annotations and the Present Condition of Dental Education in the Capital of the Republic of Mexico.* Fourth International Dental Congress, Vol. III, Sec. IX.

14. Blom, Frans, *A Maya Skull From the Ulloa Valley, Republic of Honduras.* Tulane University Studies of Middle America, Publication 5, No. 1.

15. Saville, M. H., Precolumbian Decoration of the Teeth in Ecuador With Some Account of the Occurrence of the Custom in Other Parts of North and South America. *Am. Anthropol.* 15:377, 1913.

16. Linné, S., Dental Decoration in Aborigine America. *Ethnos*, Vol. 5, Nos. 1 and 2, 1940. Stockholm: Ethnographical Museum of Sweden.

Fig. 7.—Skull from Island of Jaina, Campeche (Maya culture). Notice jade inlay in right central incisor of the maxilla (Moedano)

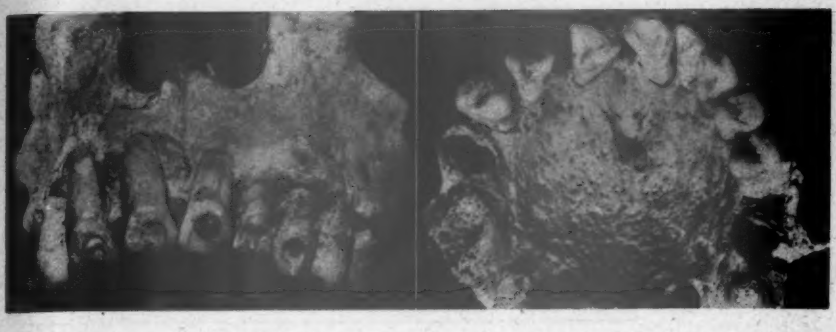


Fig. 8.—Specimen from Island of Jaina, Campeche (Maya culture). Left: Front view showing left central incisor with jadeite inlay in place. Note the empty cavities from which inlays have dropped out. The right lateral incisor is missing. Right: Palatal view, showing absence of the right lateral incisor lost during life, probably through a pulp injury resulting from a defective cavity preparation for the inlay

a pilgrimage to Teotihuacán and died there.

Moedano[17] described two maxillas with jade inlays in the front teeth found in a burial on the island of Jaina (Fig. 7).

I have in my possession a fragment of an upper jaw originating from the same island of Jaina and containing five anterior teeth, the two left bicuspids and one right bicuspid, the right lateral incisor being missing. According to the experts of the National Museum of Anthropology of Mexico, the left central incisor contains a jadeite inlay, which has a convex surface. The remaining incisors and cuspids have empty circular cavities prepared for inlays, the incisal edges of which are fractured, except for the left cuspid. The incisal edge of the left cuspid is in perfect condition, the cavity of the inlay being well defined (Fig. 8).

The irregular position of the right central incisor and cuspid probably is due to the absence of the right lateral incisor lost during the life of the person through a pulp injury, perhaps brought on as the consequence of the defective preparation of the cavity for the inlay. The roentgenogram taken of this specimen did not reveal any abnormal condition.

17. Moedano, H. K., Jaina: Un Cementerio Maya. *Rev. mex. de antropología*, Vol. 8, Nos. 1, 2 and 3.

Summary

Tooth mutilations in Mexico were performed in periods comprising various centuries B. C. and up to the early part of the sixteenth century, the time of the conquest.

Tooth mutilations in Mexico were performed during the life of the person, for decorative or religious purposes.

The technic of the preparation of cavities for inlays reveals sufficient knowledge of dental anatomy on the part of the operator.

Tooth mutilations were performed on adolescent and adult subjects.

The filings, as well as the inlays, were made with great skill.

Some defective mutilations caused pathologic processes and the functional loss of the teeth.

In Mexico, inlays were made of hematite, jadeite and jade and were circular in form, with convex or flat surfaces.—*40 Madero Avenue.*

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EDITORIALS

PRESIDENT TRUMAN ADVOCATES COMPULSORY HEALTH INSURANCE

In his January 7 message on the state of the nation, President Truman placed himself in a paradoxical position. In one paragraph he extolled the merits of private enterprise; in another he recommended measures that would curtail private enterprise and place health services for 143,000,000 free people under federal control.

"Growth and vitality in economy," said the President, "depend on vigorous private enterprise. Free competition is the key to industrial development . . . competition is seriously limited today in many industries by the concentration of economic power and other elements of monopoly."

The President implied, however, that private initiative and free enterprise are not vital to the growth and development of America's health services.

"We are rightly proud," the President continued, "of the high standards of medical care we know how to provide in the United States . . . . however . . . . most of our people cannot afford to pay for the care they need. I have often and strongly urged that this condition demands a national health program. The heart of the program must be a national system of payment for medical care based on well-tried insurance principles."

If a compulsory health insurance program is forced on the American people, private enterprise and personal initiative, which the President admitted are so essential, will be curtailed in the field of health. Physicians and dentists will become servants of the state. They will serve society on the same basis and under conditions similar to those that now prevail in our public educational system.

While the United States, under private enterprise, was developing the high standards of medical care of which the President spoke so proudly, our public school systems, under government control, suffered. "Our educational systems," said the President, "face a financial crisis. It is deplorable that in a nation as rich as ours there are millions of children who do not have adequate schoolhouses or enough

teachers for a good elementary or secondary education." Thus the President, in a few short words, contrasted the satisfactory development made by medicine and dentistry, functioning under private enterprise, with the less satisfactory development made by education, functioning under government control. As has been pointed out many times, public school teachers in many communities are underpaid and overworked, and public school systems in many communities are honeycombed with politics and patronage. Is there any reason to suppose that health services will fare better than educational services under government guidance?

If the President's compulsory health insurance program is forced on the country, some future President, in his annual message, may be compelled to include a statement somewhat as follows: "Our health, as well as our educational systems, face a financial crisis. It is deplorable that in a nation as rich as ours there are millions of children who do not have access to adequate educational, medical and dental services." The President's statement that "most of our people cannot afford to pay for the care they need" may be questioned. It is true, however, that too large a proportion of the American people cannot afford full medical and dental care. It is true also that many families, especially those in some rural areas, suffer because health services are not readily available. Unquestionably, health services should be made available to all, regardless of income or geographic location, and the time may arrive when they will be made available. The experience of other countries, however, should be ample proof that compulsory health insurance will not bring about this ideal condition.

For ten years the American Dental Association has recommended a long term program that will improve dental health. This program consists of three basic principles: (1) adequate provision for dental research which may lead to the prevention of dental diseases, (2) adequate educational procedures that will motivate people to avail themselves of preventive dental care and (3) public financed dental service for families which cannot afford such service for themselves. Such service should be supplied by the local community, and all available resources first should be used to provide dental treatment for children and to eliminate pain and infection for adults.

There is little likelihood that the present Congress will consider seriously the passage of a compulsory health insurance bill. However, the fact that the executive head of the nation strongly advocates the adoption of such a bill should place those who do not agree on their guard. Every dentist should use this influence to prevent the American public from becoming saddled with a system that will not solve satisfactorily its health problems.

THE STERILIZATION OF THE DENTAL HANDPIECE

Most dental offices are models of sanitation. Dentists pride themselves on the cleanliness of their operating rooms and on the condition of their equipment. Few members of the profession would think of operating with unscrubbed and un-

sterilized instruments. Yet the one instrument that is used most often, the handpiece, is cleansed the least. Burs and mandrels, disks and stones are sterilized thoroughly before use. However, the chuck, which holds them and which also enters the mouth, may be indifferently cleansed. All too frequently it may be contaminated and may carry contamination from one patient to another.

The possibility that cross infection may be caused by handpieces has been demonstrated by Knighton,[1] who made a study of handpieces used by students at the University of Louisville School of Dentistry. Contra-angle and right angle handpieces were run for one minute in 50 cc. of an 0.85 per cent solution of sterile sodium chloride. The different saline solutions in amounts of 1 and 0.1 cc. then were mixed with Difco heart infusion agar containing 5 per cent defibrinated rabbits' blood. The cultures were studied after forty-eight hours of incubation at 37 C. The colonies were counted, and the total number of viable bacteria for each suspension was estimated. Some of the handpieces were run in the saline solution immediately after an operation; others were run from two to twenty-four hours later. In a few cases the students used a commercially prepared disinfecting solution between the time of the operation and the time of culturing. All of the ten handpieces tested immediately after operation showed a positive bacterial growth, with an average colony count of 61,000. The seventeen handpieces tested two hours after operation all showed the presence of bacterial growth, with an average colony count of 32,000. Sixteen of the nineteen handpieces that were tested eighteen to twenty-four hours after use had an average colony count of but 500. This low count may be accounted for partially by dehydration and partially by some residual effect from previous use of chemicals.

Knighton also reported on the effectiveness of cold sterilization of handpieces. Sixteen right angle handpieces were run for five minutes in 50 cc. of paraffin-stimulated saliva, dried and left for twenty minutes in sterile Petri dishes. Half of these handpieces then were run for one minute in 100 cc. of an 0.85 per cent solution of sterile sodium chloride, and plate counts were made. The second group of handpieces was run in 50 cc. of disinfecting and cleansing solution, wiped well, run in 100 cc. of saline solution and then cultured. Results indicated that the use of a disinfecting solution reduced the number of colony counts but also indicated that sterility cannot be guaranteed by this method.

As early as 1924, Appleton[2] demonstrated the practicability of sterilizing handpieces by immersion in a hot oil bath, but the method has not been adopted generally. It was revived, however, in some of the Army and Navy dental centers during the late war. The maintenance and sterilization of handpieces presented difficult problems to dentists in the armed forces. Parke[3] reported that one naval training center solved both problems by running handpieces in a cleansing solution for one minute after each use and then immersing them for five minutes in a hot oil bath. The cleanser consisted of a solution of xylol, carbon tetrachloride and liquid petrolatum. The sterilizing solution consisted of heavy liquid petrolatum heated to 300 F. Handpieces treated in this manner were reported to be relatively sterile and gave more efficient service over longer periods of time. During a five months' period after the adoption of this method of sterilization there was a 61 per cent drop in the number of handpieces turned in for servicing.

Dentists in the British armed forces, particularly those assigned to outlying stations, faced the same problems of keeping their handpieces sterile and maintaining

1. Knighton, H. T., Unpublished material.
2. Appleton, J. L. T., *Bacterial Infection*. Philadelphia: Lea & Febiger, 1944, p. 62.
3. Parke, G. L., Sterilization and Lubrication of Dental Handpieces. *U. S. Nav. M. Bull.* 45:955 (November) 1945.

them in serviceable condition. Harvey, LeMay and Shuttleworth[4] reported that the problem was solved in one R.A.F. dispensary by adding 2 per cent of an anticorrosive agent to the ordinary alkaline aqueous sterilizing solution. This agent consists of 95 per cent of a light petroleum neutral oil (containing approximately 64 per cent paraffins, 31 per cent naphthalenes and 5 per cent aromatics) and 5 per cent of a complex of metallic petroleum sulfonates. According to these authors, boiling of handpieces for five minutes in the solution rendered them free from ordinary nonresistant types of organisms and acted as a lubricant as well.

It is quite apparent from the few studies that have been made on the subject that the most effective method of sterilizing handpieces without injury to their mechanism is first to flush them in a good cleansing solution and then boil them in oil. This procedure may require a little extra equipment and additional expense, but it is unlikely that the expenditure will be commensurate with the cost of several unusable handpieces.

A worn and untrue handpiece adds to the patient's discomfort, prevents precise cavity preparation, taxes the dentist's nerves and increases operating costs. Unsterilized handpieces are dangerous, and their use cannot be condoned.

It would appear that the handpiece is the sole surviving source for the transmission of infection in many dental offices. All other avenues have been closed by simple and inexpensive methods of sterilization. Processes have been devised that will prolong the life of the handpiece and render it surgically clean. By adopting these procedures, dentists can render better service to their patients.

4. Harvey, Warren; LeMay, C. H., and Shuttleworth, C. W., The Sterilization of Dental Handpieces. *Proc. Roy. Soc. Med.* 15:507 (July) 1947.

ACTIVITIES OF THE COUNCIL ON DENTAL HEALTH

JUST as the dentist has a responsibility in safeguarding the health of his patients, the American Dental Association has a responsibility in protecting the health of the public. During the early years of its existence, organized dentistry attempted to fulfill that responsibility by improving its technics, broadening its education and developing its literature. More recently the Association has widened its sphere of usefulness by assuming more responsibility in extending dental service to greater groups of people.

A large share of this responsibility has been delegated to the Council on Dental Health which was established by the House of Delegates in 1942. The Council on Dental Health is composed of nine members who, like members of all other committees of the Association, serve organized dentistry with no thought of personal reward or remuneration. A staff of eight employees assists the Council in carrying out its many and diversified duties. These duties, as defined in the Constitution and Administrative Bylaws, are primarily "to study the need, develop plans and programs for the provision of more adequate dental care for the public and to study and make recommendations concerning any other plans or programs developed to promote

the dental health of the public." This is a gigantic task. In order to accomplish this task the Council must investigate and analyze all the known factors related to the prevention and control of dental disease and from these studies formulate methods and programs for the improvement of dental health. Thus, the scope of the Council's duties ranges from studies of preventive measures that may be used in the private office to the control of dental disease by public health methods.

One of the most important current activities of the Council consists of aiding state dental societies in organizing and conducting workshops in dental health planning. These conferences are designed to assist states in developing more effective dental health programs. As a corollary to this service the Council conducts a continuous study of America's dental needs and formulates proposals for meeting those needs, which it submits to the House of Delegates for approval. It provides the individual practitioner with information, stimulation and methods with which he can aid intelligently in promoting dental health in his community. It encourages dental students and recent dental graduates to provide high quality dental service for children. It collects information on the plans and programs of official and voluntary health agencies and furnishes this information to the dental profession. It serves as a liaison committee between the American Dental Association and other national health and welfare organizations. It works closely with the Veterans Administration in order to assist in improving the dental treatment program for veterans. At the present time several unsatisfactory procedures in the dental program of the Veterans Administration are being studied by the Council in the hope that corrections may be obtained. The Council cooperates with the Council on Dental Therapeutics in evaluating new findings and procedures recommended to prevent or control dental diseases and distributes this information to members of the profession. It furnishes data on current trends to the officers and committees of the Association in order that they may take action in the best interest of the public and the profession. It provides personal assistance and technical information to dentists who need to prepare a lecture on a dental health subject and, through its Division of Dental Health Education, it provides members, dental societies and other organizations with a fund of dental health educational material consisting of books, pamphlets, posters, charts, motion pictures, slides and exhibits.

This is but a partial list of the services rendered by one committee of the American Dental Association. Each one of these services, directly or indirectly, improves the dental health of the American people. Each one, directly or indirectly, improves the status of the practicing dentist. No dentist who is informed on the activities of the Council on Dental Health can question the benefits of membership in organized dentistry. Certainly these services cost money, but their worth outweighs their cost. The budget of the Council on Dental Health for the current year is $54,100, of which $28,300 is used for the promotion of the health education program of the Association. Interpreted on the basis of cost for each member, this means that each member contributes 42 cents toward the broad services of the Council on Dental Health and 47 cents toward the health education activities. Only through organization can so much be had for so little.

REPORTS OF

COUNCILS AND COMMITTEES

COUNCIL ON DENTAL THERAPEUTICS

FLUORIDES:

QUESTIONS AND ANSWERS

THIS is one in a series of questions and answers papers which are prepared by qualified experts at the request of the Council on Dental Therapeutics. Others in preparation deal with general anesthetics and disinfection of instruments.

Q. Are any of the suggested uses of fluorides in dentistry ready for general application?

A. Application by the dentist of a dilute (0.05 to 2.0 per cent) aqueous solution of sodium or potassium fluoride to the permanent teeth of children immediately after prophylaxis appears to have value as a measure for reducing the incidence of caries, if the solution is used properly.[1-7]

Q. What concentration of aqueous sodium or potassium fluoride is the best to use for this purpose?

A. It is not evident that any concentration or any particular fluoride is superior to any other, or that pure water is the best solvent. However, the use of 2 per cent aqueous sodium fluoride is supported by the most extensive evidence thus far obtained clinically.[8]

Q. How should the fluoride solution be applied?

A. A method which has been successful in experimental use is described briefly as follows[8]:

> The treatment consisted of isolation of the teeth with cotton rolls, drying the teeth with compressed air and wetting the crown surfaces of the teeth with 2 per cent sodium fluoride solution. The applied solution was allowed to dry in air for approximately 4 minutes. After the cotton rolls had been removed, the child was instructed to expectorate and he was then dismissed.

The fluoride application should be preceded by a prophylaxis when feasible.

Q. Is this method safe?

A. Yes, if carried out with reasonable care.

Q. Should public water supplies which are fluoride-deficient be "built up" to

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1. Cheyne, V. D., Human Dental Caries and Topically Applied Fluorine: A Preliminary Report. *J.A.D.A.* 29:804 (May) 1942.

2. Bibby, B. G., A New Approach to Caries Prophylaxis: A Preliminary Report on the Use of Fluoride Applications *Tufts D. Outlook* 15:4 (May) 1942.

3. Knutson, J. W., and Armstrong, W. D., The Effect of Topically Applied Sodium Fluoride on Dental Caries Experience. *Pub. Health Rep.* 58:1701 (November 19) 1943.

4. Knutson, J. W., and Armstrong, W. D., The Effect of Topically Applied Sodium Fluoride on Dental Caries Experience. II. Report of Findings for Second Study Year. *Pub. Health Rep.* 60:1085 (September 14) 1945.

5. Knutson, J. W., and Armstrong, W. D., The Effect of Topically Applied Sodium Fluoride on Dental Caries Experience. III. Report of Findings for the Third Study Year. *Pub. Health Rep.* 61:1683 (November 22) 1946.

6. Knutson, J. W.; Armstrong, W. D., and Feldman, F. M., The Effect of Topically Applied Sodium Fluoride on Dental Caries Experience. IV. Report of Findings With Two, Four and Six Applications. *Pub. Health Rep.* 62:425 (March 21) 1947.

7. Council on Dental Therapeutics Reports on Topical Application of Fluorides. *J.A.D.A.* 34:700 (May 15) 1947.

the optimal concentration (1.0 part per million) of fluorine?

A. The evidence that addition of fluoride to deficient public water supplies will effect a reduction in the incidence of caries is presumptive. However, epidemiologic findings strongly support the idea,[8] and experiments carefully designed to test the effectiveness and safety of such additions are in progress. Fluorination of domestic waters is expected to reduce the incidence of new caries by as much as 40 to 60 per cent in populations using them. More promising methods of controlling or preventing tooth decay appear remote at this time, but more extensive fluorination of public water supplies should await the demonstration of positive results from the experiments now in progress.

Q. Should fluoride tablets be prescribed for use by the patient?

A. No anticaries agent in the hands of the patient is likely to be effective. The fluorides are toxic at a relatively low level of intake. The evidence of their effectiveness is inadequate. Therefore the use of fluoride preparations for oral administration by the patient should be considered experimental until more satisfactory evidence is available.

Q. Do fluoride mouthwashes or dentifrices reduce the incidence of caries?

A. They have not been shown to be effective. In fact, the evidence with regard to mouthwashes[9] and dentifrices[10, 11] is essentially negative.

Q. Should small amounts of fluoride be added to milk or other foods in order to prevent caries?

A. The safety and effectiveness of this procedure is doubtful, because of difficulty in controlling the daily intake. The therapeutic value of fluorides incorporated in food has not been demonstrated.

Q. A 33 per cent paste of sodium fluoride, together with china clay (kaolin) in glycerin, has been suggested for desensitizing dentin. Is it safe and effective?

A. Evidence of the suitability of this preparation is inadequate.[12] In any event, it should not be sealed in or on the cut dentinal surface, because fluorides have been shown to devitalize the pulp when sealed in freshly cut dentin.[13]

Q. Should fluoride be mixed with pumice for use in polishing the teeth in the dental office?

A. There is some evidence in favor of adding hydrogen peroxide and sodium fluoride to mixtures used in prophylaxis.[9] This use of fluorides is still experimental.

Q. Why does the Council on Dental Therapeutics take such a conservative attitude toward the use of fluorides, even though they seem to offer possibilities for significant reduction of caries?

A. There is always a tendency to overuse any new drug on the ground that "if a little is good, more is better." Overdosing with fluorides may be a significant hazard, especially if the patient is permitted to exercise control over the amount taken or the manner in which it is taken. A conservative attitude tends to reduce such a hazard and limit the fluorides to their proper place in therapeutics.

8. Dean, H. T., Epidemiological Studies in the United States, in *Dental Caries and Fluorine*. Washington: American Association for the Advancement of Science, 1946, p. 5.

9. Bibby, B. G., and others, Preliminary Reports on the Effect on Dental Caries of the Use of Sodium Fluoride in a Prophylactic Cleaning Mixture and in a Mouthwash. *J. D. Res.* 25:907 (August) 1946.

10. Shaner, E. O., and Smith, R. R., Clinical and Bacteriological Studies of the Use of a Fluoride Dentifrice *J. D. Res.* 25:121, 126 (June) 1946.

11. Bibby, B. G., A Test of the Effect of Fluoride-Containing Dentifrices on Dental Caries. *J. D. Res.* 24:297 (December) 1945.

12. Hoyt, W. H., and Bibby, B. G., Use of Sodium Fluoride for Desensitizing Dentin. *J.A.D.A.* 30:1372 (September) 1943.

13. Lefkowitz, William, and Bodecker, C. F., Sodium Fluoride; Its Effect on the Dental Pulp: Preliminary Report. *Ann. Den.* 3:141 (March) 1945.

PRELIMINARY COMMENTS ON DENTAL PRODUCTS

In order to provide helpful information promptly, the Council on Dental Therapeutics has authorized the publication of preliminary comments concerning commercial preparations which are within its scope. The comments are limited to clear-cut facts and references to previously published information and written opinions. The Council will authorize the publication of comprehensive status reports at a future time if they appear to be needed and will accept those products which, upon investigation, are found to be eligible for inclusion in *Accepted Dental Remedies* in accordance with its rules.

The products listed below have not been accepted by the Council.

The "Ohio" Periodontal Insufflator

The "Ohio" Periodontal Insufflator is an apparatus advertised for use in connection with the oxygen insufflation of periodontal tissues. This procedure is advocated by some as an adjunct in the treatment of periodontal disease and was originally introduced by Dunlop (Dunlop, W. F., *Pyorrhea and Its Treatment,* Chicago: Dunlop Research Institute, 1913). Recent advertisements by the promoting firm advocate its use in the treatment of so-called Vincent's infection.

The Dunlop products and treatment have been the subjects of several adverse reports by the Council on Dental Therapeutics.

More recent reports on "oxygen therapy" continue to be unconvincing and lacking in acceptable scientific evidence. The report cited by the Ohio Chemical and Manufacturing Company contains no findings based upon controlled observations.

Readers may be interested in the reference to oxygen insufflation appearing in the 1947 edition of *Accepted Dental Remedies* (p. 47).

Postolene

Postolene: In accordance with routine procedure, a registered letter of inquiry was sent to J. A. Sprague, Inc., manufacturers of Postolene, on September 12, 1947. No reply has been received from the firm. A sample of the product was purchased on the open market.

The product is a pale yellow heavy paste, supplied in a half-ounce jar which costs a dollar. It is stated to contain zinc oxide, iodoform, creosote, barium sulfate, cassia and clove oils, phenol and lanolin.

According to the label and package insert, Postolene is an antiseptic application for abscessed teeth and a permanent filling for root canals and for pulp capping. It is also suggested as a toothache remedy. The Council does not have information concerning the effectiveness or safety of this product.

StomAseptine

StomAseptine: This product is a white powder, stated to contain sodium perborate, sodium borate, sodium bicarbonate, sodium chloride, menthol, thymol, methyl salicylate, eucalyptol and aromatics. It is labeled for use in aqueous solution as a mouth wash and gargle and in substance as a dentifrice.

A solution of the powder in water is lavender in color. The label states, "If

the mouth is in an acid condition, the expectorated solution will show lighter in color."

StomAseptine is labeled "The accepted oral synteretic." It is not accepted by the Council on Dental Therapeutics.

For a discussion of the properties of sodium perborate, the reader may wish to refer to the 1947 edition of *Accepted Dental Remedies* (p. 103).

Powdalator

Powdalator: This product consists of a rubber bulb, a metal needle adapter and a sealed glass tube shaped like an eye dropper. Each tube is stated to contain a sterile mixture consisting of calcium penicillin, 1,000 units; sulfathiazole, 0.125 gm., and sulfanilamide, 0.125 gm.

The Powdalator is intended to be used to spray the sterile mixture "into post-extraction sockets or other wounded surfaces within the mouth." The Council has not accepted any mixtures of antibiotics and sulfonamides.

The interested reader may wish to consult the following sections of the thirteenth edition of *Accepted Dental Remedies*: page 238, Attitude on Mixtures; page 104, Penicillin, and page 122, The Sulfonamide Compounds. The Council on Pharmacy and Chemistry of the American Medical Association recently announced the deletion of sulfonamides for local application from its comparable publication, *New and Nonofficial Remedies.*[1]

In support of the inclusion of sulfanilamide and sulfathiazole in its product, the firm states, ". . . . penicillin itself is very hygroscopic and . . . . to keep the powder in a form that it could be blown required that the penicillin be diluted with something which would not inactivate the penicillin itself. We believe that there are very good reasons for selecting a small quantity of sulfonamides for this purpose rather than gums or starches."

1. Sulfonamides for Local Application Deleted From N.N.R. *J.A.M.A.* 135:157 (September 20) 1947.

COUNCIL ON DENTAL HEALTH

CONFERENCE WITH OFFICIALS OF THE VETERANS ADMINISTRATION AND THE OFFICE OF VOCATIONAL REHABILITATION

Veterans Administration Program

DURING the past year nearly all of the state dental societies reported difficulties in providing dental services for veterans under the Veterans Administration program. After studying these reports, the Council on Dental Health decided it would be advisable to re-examine the dental treatment program for veterans. State dental societies were requested to advise the Council on Dental Health of the major difficulties that dentists have encountered in participating in the program and to submit suggestions for appropriate revisions of regulations and administrative policies.

Summary of State Reports.—In general terms, all state societies reported similar difficulties in connection with the

dental treatment program for veterans. The criticisms and suggestions most frequently expressed are as follows:

1. State fee schedules should be reviewed again in the light of changes in economic conditions since the fee schedules were adopted approximately a year and a half ago.

2. Delays in securing authorization for treatment and payment for services rendered have seriously handicapped dentists as well as veterans and have resulted in a decision by many dentists to withdraw from the program.

3. The examination form is unnecessarily complicated. In addition, the coding system used on the form is not in keeping with the system adopted by the American Dental Association.

4. Regulations followed by the Veterans Administration do not give veterans free choice of dentist, particularly in cities in which dental clinics are located.

5. In many instances too little regard is given to the recommendations of dentists relative to the type of treatment the veteran should receive.

6. Participating dentists have been suspended without a fair hearing in cases in which alleged violations of ethics or agreements occurred.

7. The regulation to refer cases to participating dentists "when dental clinic service is not feasibly available" is open to various interpretations and should be clarified.

8. In a number of instances arbitrary actions are reported to have been taken by regional and local V.A. officials without consulting with officers of state dental societies.

Conference With V.A. Officials. — In recognition of the difficulties listed, the general secretary of the American Dental Association agreed to request a conference with the newly appointed officials of the Veterans Administration.

The assistant to the general secretary of the American Dental Association and the executive secretary of the Council on Dental Health secured an appointment with Paul B. Magnuson, chief medical director, and E. W. Kennedy, acting assistant medical director for dental services, on Monday, January 26, 1948.

Dr. Magnuson offered to cooperate with the American Dental Association in making changes in the dental treatment program for veterans in so far as the basic law and available facilities would permit. Dr. Magnuson promised to study the difficulties listed in this report and agreed to discuss the possibility of making appropriate changes with representatives of the American Dental Association at a later date.

The American Dental Association was requested to continue to make its position known to the Washington office of the Veterans Administration in order to provide the type of dental service for veterans to which they are entitled by law.

A study of the present case load indicates that most of the offices of the Veterans Administration soon may be able to complete authorizations and to pay outstanding obligations to participating dentists within a more reasonable interval of time than in the past. Investigations also reveal that the V.A. in all probability will not revise drastically the basic principles of the program in the near future and that changes in regulations and administrative policies will be confined to such revisions as will hasten authorization and payment.

During the conference on January 26 the representatives of the American Dental Association questioned the advisability of continuing the present regulations which make treatment for service-connected dental disability available to the veteran for the rest of his life. It was pointed out that there is no direct evidence that such a policy was the original intention of Congress. Dr. Magnuson agreed that, in all probability, the intention of Congress was to provide the means for rehabilitating the mouths of

veterans to correct injuries and defects which occurred as a result of military service, such rehabilitation to constitute final obligation on the part of the United States Government. Dr. Magnuson stated that he would study the law and would report his findings to the American Dental Association.

The California Resolution.—The Executive Council of the Southern California State Dental Association has submitted a resolution to the Board of Trustees and the House of Delegates which requests that the American Dental Association attempt to secure a drastic change in the V.A. program. The resolution requests that veterans be granted a sum of money for service connected disability or defect which he can use to pay a dentist in full or in part for dental treatment. In order to determine if such revision of the program would be possible or desirable, it would be necessary to study the basic law and to assess the difficulties and dangers that might result from such a practice.

Vocational Rehabilitation

During the past year communications have been exchanged between the central office of the American Dental Association and the Office of Vocational Rehabilitation, Federal Security Agency, Washington, D. C. The Council on Dental Health is of the opinion that the problems under consideration should be reported to the Board of Trustees.

The Vocational Rehabilitation Act was adopted July 6, 1943, by the Seventy-eighth Congress. This act is known as Public Law 113 and makes provisions for rehabilitating persons who are disabled in order to render them fit to engage in a remunerative occupation. The vocational rehabilitation services are administered by state agencies.

In some instances, dental services are provided for eligible persons under the vocational rehabilitation program. A number of state societies have reported that the policies of state agencies in making such dental services available have not been entirely acceptable to the dental profession. This is particularly true of policies relating to fee schedules.

In order to clarify a number of the points relative to this program, the executive secretary of the Council on Dental Health conferred with Thomas B. McKneely, chief medical officer of the Office of Vocational Rehabilitation, in Washington on January 26, 1948. The conference resulted in agreement that the provision of dental services under the vocational rehabilitation program has not been carried out effectively. It was agreed further that the most logical approach to this problem would be to include a dentist on the National Professional Advisory Committee of the Office of Vocational Rehabilitation and to devise means for frequent consultation between state rehabilitation agencies and state dental societies.

After the conference with Dr. McKneely in Washington, the American Dental Association received a formal request to name three dentists, one of whom would be selected by the Office of Vocational Rehabilitation to represent the American Dental Association on the National Professional Advisory Committee.—*Allen O. Gruebbel, D.D.S., Executive Secretary.*

BOARD OF TRUSTEES HOLDS ANNUAL MIDWINTER MEETING IN CHICAGO FEBRUARY 5 TO 8

The Board of Trustees of the American Dental Association held its midwinter meeting at the central office in Chicago, February 5 to 8. The following officers and members of the Board were in attendance: H. B. Washburn, President; Clyde E. Minges, President-Elect; Philip E. Adams, First Vice-President; Fred A. Richmond, Second Vice-President; A. M. Smith, Jr., Third Vice-President; Harold Hillenbrand, Secretary; Louis M. Cruttenden, Assistant Secretary; R. H. Volland, Treasurer; Lon W. Morrey, Editor; Leroy M. Ennis, Harold W. Oppice, O. H. Moen, Daniel F. Lynch, J. E. John, Sr., J. B. Carr, C. S. Foster, Robert P. Thomas, Henry Hicks, William McGill Burns, Willard Ogle, Fred S. Shandley, R. C. Dalgleish.

Local Arrangements Committee. — The Board approved the appointment of the following chairmen of the Local Arrangements Committee for the September 1948 meeting of the American Dental Association: General chairman, Leo W. Kremer; vice-chairman, Paul W. Clopper; honorary chairman, George Walter Dittmar; Publicity Committee chairman, Milton Cruse; Reception Committee chairman, Robert G. Kesel; Scientific and Health Exhibit Committee chairman, Arthur J. Skupa; Clinic Committee chairman, Fred N. Bazola; Information Committee chairman, Elmer M. Ebert; Entertainment Committee chairman, Melford E. Zinser.

Change in Fiscal Year.—In order to facilitate the business affairs of the Association the Board of Trustees at its special meeting in October 1947 tentatively approved a recommendation for a change in the Constitutional and Administrative Bylaws whereby the fiscal year of the Association will correspond to the calendar year. The treasurer and business manager were appointed as a special committee to investigate the effects of changing the fiscal year from July 1-June 30 to January 1-December 31. This committee reported that the change would be advantageous as annual budgets would be prepared on a future basis, financial statements would be simplified and audit reports would be easier to analyze. The Board of Trustees could pass on all expenditures before any commitments were made and newly appointed committee chairmen would have control of all their appropriations. Accordingly, the Board authorized the preparation of future budgets on the basis of the calendar year.

Distribution of Materials.—Because of the large number of requests received from other countries for THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION, the JOURNAL OF ORAL SURGERY, the *Index of Dental Periodical Literature* and other Association material, the Board approved a recommendation that the Association should endeavor, within reasonable limits, to supply its literature to bona fide dental organizations in wartorn countries and recommended that the Committee on International Relations investigate the eligibility of organizations seeking such material.

Chairman Appointed for 1950.—The Board of Trustees confirmed the appointment of Edward R. White, Jersey City, N. J., as general chairman of the Committee on Local Arrangements for the annual meeting of the Association which will be held in Atlantic City in September 1950.

Horace Wells Memorial.—The Committee on Horace Wells Centenary was granted

$3,200 to help underwrite the publication of the Horace Wells Memorial volume. This sum is in addition to an underwriting appropriation of $1,987 previously made to the committee for the same purpose. Three years have been devoted to the preparation of the Horace Wells volume which, it is hoped, will clarify the story of anesthesia. The completed text has been approved by the Committee on History of the Association. Income from the sale of the Horace Wells volume, which will be sold at cost, will enable the Association to recapture this underwriting expenditure.

War Memorial.—The Committee on War Memorial was authorized to complete and verify a list of the names of those dentists who died on active duty during the two World Wars and to proceed with its study of plans for a war memorial. It was recommended, however, that because of the present financial situation of the Association no new procedures entailing expenditures for a war memorial should be undertaken by the Association without the consent of the Board and no solicitation of members of the Association shall be permitted without this sanction.

International Relations. — The Board of Trustees, on recommendation of the Committee on International Relations, recommended that the committee continue its activity of promoting dental teaching missions to devastated countries and give further consideration for financing such missions under the provisions of the Fulbright Act or World Health Organization.

Process Patent on Acrylic Eye.—In the opinion of the Committee on Patents and Honorary Awards any one, at the present time, may make acrylic or plastic eyes without fear of difficulty since liability does not begin until the patent is finally issued. In order to bring this information to the attention of all members the Board recommended that the following notice be published in THE JOURNAL:

Rights Under the Patent Laws

Some members of the Association have inquired if anyone should use a device or process on which a patent has been applied for. Would such a user, when the patent is finally issued, be liable for infringement and damages?

The answer to the question is, no.

Prior to the actual granting of a patent, anyone may use a device, practice a method or employ a technic which the patent, when issued, will disclose.

Prior to the issuance of a patent, no member of the Association need accept a license, pay royalties or any other consideration. Damages for infringement can be assessed only from the date on which the patent is issued.

Vocational Rehabilitation.—The Board approved a recommendation of the Council on Dental Health that the names of three dentists be submitted to the office of Vocational Guidance, one of whom would be selected by that office to represent the American Dental Association on the National Professional Advisory Committee.

Survey of Dental Research.—The Board recommended that appropriate steps be taken by the Research Commission of the Association to secure an advisory committee of governmental and non-governmental scientists whose primary interest is in dental research, as a subcommittee of the Federal Interdepartmental Research Committee.

Journal Fund.—The Board authorized the discontinuance of the Journal Fund, amounting to $200,000, and instructed the treasurer to transfer this sum to the general fund for general purposes.

Legislative Program.—At the request of the Committee on Legislation the Board appointed a committee of five to study the legislative program of the Association in all its relations, including (a) an analysis of the Association's present legislative job, (b) the question of the need of a Washington office or representative in the capital, (c) legislative service in the states and legal advice to members, (d) the relationship of the legislative pro-

gram to the central office and (e) the administration of the legislative activities. The committee is to report its findings to the Board of Trustees at the September 1948 session. Members of the committee are: Harold W. Oppice, chairman, Willard Ogle, Percy T. Phillips, Ernest G. Sloman and Sterling V. Mead.

Future Meeting Dates.—The 1948 annual session of the American Dental Association will be held in Chicago, September 13 to 17. The 1949 annual sessions will be held in San Francisco, October 17 to 21. The 1950 annual session will be held in Atlantic City, October 30 to November 3.

Deficiency Budget.—The major part of the Board's deliberations were devoted to the consideration of the Association's unbalanced budget. At its October, 1947 meeting the Board requested each agency of the Association to prepare a budget for the first half of the fiscal year 1948-1949 that would not exceed 75 per cent of its budget for the first half of the fiscal year 1947-1948. These budgets were prepared and submitted to the Board for consideration at the February 1948 meeting. Despite the reduction incorporated in many committees' budgets the total anticipated expenditures of the Association will amount to $220,000 more than anticipated income. The Board refused to approve the requests and voted to return all budgets to the agencies of the Association with the instruction that budgetary provision be made only for activities which are essential to the agency's continued existence. The text of the resolution is as follows:

Be it Resolved, that all budgets prepared for the first half of the fiscal year, 1948-1949, be returned to the agencies of the Association with the instruction that budgetary provision be made only for those skeletal activities which are absolutely essential to the agency's continued existence, and

Be it further Resolved, that each agency is directed to prepare such a budget for the full fiscal year of 1948-1949 on a basis which will not exceed 75 per cent of its 1947-1948 budget, and

Be it further Resolved, that all agencies of the Association be directed to provide such a revised budget and a complete explanation of all reductions and their effect on the agency's activities by May 1, 1948.

COUNCIL ON DENTAL EDUCATION ACTS ON ACCREDITATION

At a meeting of the Council on Dental Education on February 5 and 6, action was taken upon the accrediting of dental schools, the approval of specialty boards and the approval of hospital dental internships and residencies. The action taken by the council is as follows:

Accrediting of Dental Schools

The School of Dentistry of the College of Physicians and Surgeons at San Francisco; full approval.

The College of Dentistry of Howard University at Washington, D. C.; full approval.

The School of Dental Medicine of Harvard University at Boston; full approval.

The School of Dentistry of St. Louis University at St. Louis, Missouri; full approval.

The School of Dentistry of Temple University at Philadelphia; full approval.

The freshman and sophomore years of the School of Dentistry of the University of Washington at Seattle; full approval.

Approval of Specialty Boards

The American Board of Pedodontics: John C. Brauer, chairman; Ralph L. Ireland, secretary; Kenneth A. Easlick, Frank A. Lamons, Paul K. Losch, Walter J. Pelton and Charles A. Sweet.

The American Board of Prosthodontics: Bert L. Hooper, chairman; I. R. Hardy, secretary; C. J. Stansbery, Carl O. Boucher, R. H. Kingery, David McLean, O. M. Dresen, F. C. Elliott and R. W. Tench.

Approval of Hospital Dental Internships and Residencies

Jersey City Medical Center, Jersey City, N. J.; internships and residencies.

The Boston City Hospital, Boston, Mass.; internships and residencies.

Elizabeth Steel Magee Hospital, Pittsburgh, Pa.; internships and residencies.

Geisinger Memorial Hospital, Danville, Pa.; internships and residencies.

Western State Psychiatric Institute and Clinic, Pittsburgh, Pa.; internships and residencies.

Jewish Sanitarium and Hospital for Chronic Diseases, Brooklyn, N. Y.; internships and residencies.

New York Polyclinic Medical School and Hospital, New York, N. Y.; internships.

Children's Hospital, Boston, Mass.; internships.

Hartford Hospital, Hartford, Conn.; internships.

Norwich State Hospital, Norwich, Conn.; internships.

Letterman General Hospital, San Francisco, California; internships.

Metropolitan Hospital, Welfare Island, N. Y.; internships.

Children's Hospital of Pittsburgh, Pittsburgh, Pa.; residencies.

CONGRESS ON LICENSURE AND DENTAL EDUCATION MEETS

The Fourth Congress on Dental Education and Licensure, sponsored by the Council on Dental Education, was held at the Stevens Hotel in Chicago on Saturday, February 7. The Congress was attended by some 250 representatives of dental schools, dental examining boards and dental societies. Wilbert Jackson, chairman of the Council, presided at the morning session and John C. Brauer, chairman of the Advisory Board for Dental Specialties, acted as moderator of the afternoon session which was devoted to a forum on dental specialties.

The principal papers at the morning session, presented by Walter H. Wright and W. A. Wilson, dealt with the interrelation of teaching and examining and were followed by discussion from the floor. Consideration was given to the possible elimination of written examinations by examining boards in the fundamental sciences and to the avoidance of examinations based merely upon the memory of the candidates. Emphasis was placed upon examinations calculated to test directly the ability and fitness of the candidate to engage in dental practice. The desirability of widening the scope of the cultural courses in preprofessional training was discussed.

At the afternoon session the activities of the several specialty boards were presented as follows: oral surgery, Howard C. Miller; orthodontics, Bernard G. DeVries; pedodontics, Kenneth A. Easlick; periodontology, Harold J. Leonard; and prosthodontics, Irving R. Hardy. All speakers endorsed in general the requirements prescribed by the Council on Dental Education for the approval of specialty boards. Various views were expressed concerning the basic educational requirements for the certification of specialists, the limitation of the practice of a specialist to his specialty and the nature and character of the examination to be conducted by each specialty board.

The committee in charge of the Congress on behalf of the Council was J. R. Blayney, chairman, Robert W. McNulty and C. E. Chamberlain.

PERIODONTOLOGY BOARD IS APPROVED BY A.D.A. COUNCIL

The American Board of Periodontology, sponsored by the American Academy of Periodontology, has been approved by the Council on Dental Education under the requirements of the Council for the approval of examining boards in dental specialties. These re-

quirements received formal approval by the House of Delegates of the American Dental Association on August 6, 1947.

The American Board of Periodontology, which was incorporated in the State of Illinois in 1940, already has issued 115 certificates to specialists in this field. In the future the issuing of certificates will be under the basic requirements prescribed by the Council.

Members of the American Board of Periodontology are Arthur H. Merritt, chairman; Harold J. Leonard, secretary-treasurer; Dickson G. Bell, M. Monte Bettman, Clarke E. Chamberlain and Samuel R. Parks.

The Council on Dental Education is considering applications for approval from the American Board of Orthodontics, the American Board of Prosthodontics and the American Board of Pedodontics. Under authority given by the House of Delegates in 1946, the American Board of Oral Surgery was approved on April 9, 1947.

A.D.A. RELEASES MEMBERSHIP FIGURES FOR DECEMBER 1947

The total membership of the American Dental Association as of December 31, 1947 is 70,443. This is in contrast to the November 30, 1947 figure of 68,775.

Broken down, the membership stands as follows:

Regular members	66,106
Undergraduate members	2,477
Life members	1,860
Total members	70,443

CONSTITUTION AND BYLAWS COMMITTEE SUBMITS REVISIONS

The standing Committee on Constitutional and Administrative Bylaws completed the revision of the proposed new constitution and bylaws at its meeting in Chicago, February 5 to 12. It is now in the form in which it will be presented to the House of Delegates at the annual meeting in Chicago this September.

The open hearings held in Chicago and Boston in 1947, and the many studied evaluations and suggestions submitted to the committee by interested parties, materially aided in the final framing of the document.

The committee feels the constitution and bylaws have been improved and streamlined in keeping with the adopted policies of the House of Delegates.

The proposed revision soon will be printed in an issue of THE JOURNAL and the committee is confident it will meet with the wholehearted approbation of the entire membership.

SPECIAL COMMITTEE TO STUDY NATIONAL DENTISTS' COMMITTEE

At the February meeting of the Board of Trustees of the American Dental Association, the following statement was approved for publication in THE JOURNAL:

"Owing to the many inquiries which have been received from the officers and members of constituent and component societies regarding the policies and activities of the National Committee of Dentists as they relate to the policies and activities of the American Dental Association, the Board of Trustees has appointed a special committee of three of its members to study policies and activities of the National Committee of Dentists as they relate to the policies and activities of the American Dental Association and report its findings at the September meeting of the Board for the purpose of conveying such findings to the House of Delegates at the annual session in September of 1948."

1947 JULY-DECEMBER INDEX OF A.D.A. JOURNAL IS PUBLISHED

The index to volume 35 of THE JOURNAL, covering the last six months of 1947, is available upon request.

ANNOUNCE LATEST REPORT OF RELIEF FUND FOR DENTISTS

The sale of Christmas seals for the benefit of the relief fund for destitute dentists has reached the total of $32,540.68 as of February 5. This amount has been received and deposited by the office of the business manager of the American Dental Association.

Another report of the sale of the seals will be announced in a future issue of THE JOURNAL.

HARRY LYONS IS ELECTED VICE-CHAIRMAN OF COUNCIL

Harry Lyons of Richmond, Va., recently was elected to the office of vice-chairman of the Council on Dental Therapeutics by the members of that council. Since 1935, he has been an active member of the Council on Dental Therapeutics.

Dr. Lyons was graduated from the School of Dentistry, Medical College of Virginia in 1923. Since then he has served on the faculty as professor of oral pathology and therapeutics, and of periodontia. He also has a part time practice that is limited to periodontia.

At the present time, Dr. Lyons is president of the Virginia State Dental Association, chairman of the Committee on Nomenclature of the American Dental Association and dental consultant to the U. S. Food and Drug Administration.

REINKING SUCCEEDS CRUTTENDEN ON RELIEF COMMISSION

Henry N. Reinking of Minneapolis has been appointed by H. B. Washburn, president of the American Dental Association, to succeed Louis M. Cruttenden as a member of the Relief Commission of the Association. This appointment will extend to the 1948 annual meeting of the American Dental Association at which time the House of Delegates will elect another member for the unexpired term ending in 1951.

COUNCIL ON DENTAL THERAPEUTICS WILL MEET IN CHICAGO IN MARCH

The Council on Dental Therapeutics will hold its annual meeting in the board room of the American Dental Association headquarters building, Friday and Saturday, March 26 and 27.

A report of the council's deliberations will be published in a later issue of THE JOURNAL.

DENTAL SOCIETIES

CHICAGO HOLDS SUCCESSFUL ANNUAL MIDWINTER MEETING

The Chicago Dental Society held its eighty-third annual midwinter meeting on February 9 to 12 at the Stevens Hotel in Chicago. Harry A. Hartley, president, and Milton Cruse, general chairman of the midwinter meeting, together with other committee chairmen and members of the Chicago Dental Society, organized a comprehensive four day meeting consisting of two general sessions, four days of essays, three days of general and table clinics and fifty-four limited attendance clinics, most of which were repeated to allow more dentists an opportunity to be present at the clinics of their choice.

In addition there were three half-days of question and answer clinics plus a daily program of motion pictures and scientific, technical, health and educational exhibits.

Enrollment figures for this year's meeting reached a total of 12,929 as compared with 13,913 last year. A total of 6,953 dentists attended the meeting this year. Of these, 2,926 were members of the Chicago Dental Society and 4,027 were visitors from other component dental societies.

ORAL PATHOLOGISTS HOLD ANNUAL MEETING IN CHICAGO

The American Academy of Oral Pathology held its second annual meeting on February 8 at the annual midwinter meeting of the Chicago Dental Society at the Stevens Hotel.

New officers elected at the meeting are: Lester R. Cahn, president; Paul E. Boyle, president-elect; Lester R. Burket, first vice-president; Henry M. Goldman, second vice-president; Hamilton B. G. Robinson, editor, and Lt. Col. Joseph L. Bernier, secretary-treasurer. Kurt H. Thoma, retiring president of the academy was the installing officer.

A total of twelve papers on oral tumors and other pathological lesions were presented by members of the academy at their all day meeting.

CONGRESSMAN MUNDT ADDRESSES DENTISTS AT CHICAGO MEETING

Congressman Karl Mundt of South Dakota was the principal speaker at the February 9 general session at the midwinter meeting of the Chicago Dental Society. Congressman Mundt's subject was "The America I Want." He proposed seven major points which, if adopted, would constitute "positive leadership" on America's part in world affairs.

Congressman Mundt also presented his observations of Europe, where he spent two months last fall as a member of a joint Senate and House committee to investigate economic, political and social conditions in several European countries.

ENDODONTISTS HOLD TWO DAY ANNUAL MEETING IN CHICAGO

The American Association of Endodontists held its annual meeting on February 7 and 8 at the Congress Hotel in Chicago, in connection with the midwinter meeting of the Chicago Dental Society.

A general business meeting and banquet were held on Saturday, February 7. The entire day Sunday, February 8, was devoted to a scientific session at which several well known essayists presented important topics for discussion.

Participating in the scientific session were Maurice T. Fliegelman, M.D., Mary C. Crowley, Gerard J. Casey, H. H. Pierson, Louis I. Grossman, E. Alan Lieban, George Hare and Samuel Turkenkopf.

The Montreal Endodontia Society presented an informative and well organized exhibit on root canal case histories at the meeting.

RESTORATIVE DENTISTRY GROUP HOLDS ANNUAL CLINIC PROGRAM

The American Academy of Restorative Dentistry held an interim meeting on Sunday, February 8 at the Stevens Hotel in conjunction with the annual midwinter meeting of the Chicago Dental Society.

After a breakfast-business meeting for officers and members of the several councils, the academy presented an all day clinic program, consisting of motion pictures, slides, models and other displays. Discussion followed the various clinics which were conducted solely by members of the academy.

The meeting of the American Academy of Restorative Dentistry this year was restricted to members of the academy and their technicians.

AMERICAN COLLEGE OF DENTISTRY PLANS FOR ANNUAL MEETING

Representatives of the American College of Dentistry held a luncheon-business meeting at the Stevens Hotel in Chicago on February 8. The group discussed proposed changes in the by-laws of the organization to be presented during the

annual meeting of the American Dental Association, September 13 to 17, in Chicago.

The secretary of the American College of Dentistry is O. W. Brandhorst, St. Louis, Mo.

INDIANA CHEMIST IS WINNER OF CHICAGO SOCIETY ESSAY CONTEST

For his research in the field of the fluorides and his essay, "Hardness of Enamel as Affected by Fluorides," Ralph W. Phillips, chemist, of Indiana University, became this year's winner in the prize essay competition sponsored by the Chicago Dental Society. Dr. Phillips delivered his essay on February 11 at the midwinter meeting of the Chicago Dental Society, at which time he also received a $500 award.

Dr. Phillips is assistant professor and head of the department of dental materials at the School of Dentistry, Indiana University.

BOARD OF DENTAL EDITORS HOLDS BUSINESS MEETING IN CHICAGO

The Board of Directors of the American Association of Dental Editors met at the Stevens Hotel in Chicago on February 8, in conjunction with the midwinter meeting of the Chicago Dental Society, to discuss plans for activities during the next meeting of the American Dental Association, September 13 to 17, in Chicago.

Thomas D. Speidel of New Orleans was chairman of the meeting.

DISTRICT OF COLUMBIA SOCIETY PRESENTS POSTGRADUATE CLINIC

The District of Columbia Dental Society will present a postgraduate clinic on March 14 to 18 at the Shoreham Hotel in Washington, D. C.

On Sunday, March 14, the clinic will feature a national radio broadcast over N.B.C. at 1 p.m., E.S.T., on "Social Trends in Dentistry." Participating in the discussion will be Sen. Robert A. Taft, representing the government, Sterling V. Mead, representing the dental profession, and Prof. Robert W. Bolwell, representing the layman in dentistry. Following the radio broadcast, there also will be a topic discussion on "The Function of the Dentist as a Citizen," featuring C. Raymond Wells and Dr. Mead, both past presidents of the American Dental Association, and Stuart Haydon, editor and author.

Sixty table clinics will be featured on Monday, March 15, and registered clinics, topic discussions, motion pictures and several social functions are on the agenda for Tuesday, Wednesday and Thursday, March 16 to 18.

MICHIGAN HOLDS SUCCESSFUL CHILDREN'S DENTAL HEALTH DAY

Approximately 300 dentists were present at the first annual Children's Dental Health Day, sponsored by the Michigan State Dental Society on February 2 at the Statler Hotel in Detroit.

Following the opening address of welcome by George Peterson, president of the Detroit District Dental Society, the morning session consisted of a program outline by Charles Jamieson, president of the Michigan State Dental Society, and the presentation of three essays by Hamilton B. G. Robinson, Claude Bierman and Isaac Schour.

Twenty-four table clinics and six limited attendance clinics, devoted to dentistry for children, were presented in the afternoon session. Alfred E. Seyler was the general chairman of the entire program.

Gov. Kim Sigler of Michigan and Mayor Eugene Van Antwerp of Detroit officially proclaimed February 2 to be Michigan's first annual Children's Dental Health Day.

PHILADELPHIA SOCIETY SPONSORS WEEKLY REFRESHER COURSES

The Philadelphia County Dental Society is sponsoring weekly sectional study refresher courses in prosthetics and pedodontics beginning March 3.

A refresher course in local and general anesthesia was begun on February 11 and will continue weekly through March 31. On February 23, a refresher course in Endodontia was begun. It will be continued weekly through March 29.

CINCINNATI SPONSORS FOURTH DENTIST BOY BANQUET

The Cincinnati Dental Society Fourth Annual Dentist Boy Banquet, was held on December 8 at the Sinton Hotel.

Maynard K. Hine of the School of Dentistry, Indiana University; Raymond E. Myers of the School of Dentistry, University of Louisville; William L. Wylie of the School of Dentistry, Western Reserve University, and Wendell D. Postle of the College of Dentistry, The Ohio State University, all deans of their respective schools, discussed requirements for entering dental schools, the unprecedented, record-making total of applications to dental schools and the future of dentistry.

Earl Lowry, secretary of the state board of dental examiners and Carlos Schott, past trustee of the American Dental Association, also addressed the group.

OMAHA DENTAL SOCIETY DEVELOPS DENTAL ASSISTANT'S COURSE

The Omaha District Dental Society has developed a course of study for dental assistants in the Omaha, Neb., area with the aim of improving their education and standing.

The course, which takes a year to complete in its entirety, covers dental office management, reception and preparation of the patient, dental anatomy, physiology and pathology, sterilization and bacteriology, local and general anesthesia, oral surgery, dental roentgenology, pedodontics, orthodontics, pharmacology, oral hygiene, diet and nutrition,

Guest speakers and officials at the Cincinnati Dental Society Fourth Annual Dentist Boy Banquet are: top row, left to right, Howard Niedhamer, president, Holly Jarvis, Carl Stricker and Eddie Ball, the co-chairmen, and seated, left to right, Maynard K. Hine, Raymond E. Myers, William L. Wylie and Wendell D. Postle

crown, bridge and full denture prosthesis, laboratory technic on removable partial dentures, first aid, carvings and drawings and dental terminology.

The instructors of the above named courses are men who teach the same subjects to dental students at the School of Dentistry, Creighton University. These instructors prepare their lectures with the aid of the outline for the dental assistant's course of study as planned by the Omaha District Dental Society.

Classes meet weekly for two hour sessions. It is hoped that upon completion of the entire course, the students will be better qualified to pass the examination for certification for dental assistants when the Nebraska State Dental Association is next in session.

STATE SOCIETIES MEETING IN MARCH AND EARLY APRIL

Kentucky.—The Kentucky State Dental Association will hold its 1948 annual meeting in Louisville on April 5 to 7.

Louisiana.—The 68th annual meeting of the Louisiana State Dental Society will be held at the Hotel Bentley in Alexandria on April 8 to 10.

Michigan.—April 12 to 14 are the dates for the annual meeting of the Michigan State Dental Society. The Hotel Statler in Detroit will be headquarters for the 1948 meeting.

Oklahoma.—The Oklahoma State Dental Association will hold its 1948 annual meeting at the Mayo Hotel in Tulsa on April 11 to 14.

Southern California.—The 1948 annual meeting of the Southern California State Dental Association will be held at the Biltmore Hotel in Los Angeles on March 29 to 31.

Texas.—The Texas State Dental Society will hold its 1948 annual meeting on April 12 to 15 in Ft. Worth.

Virginia.—On April 12 to 14 the Virginia State Dental Association will hold its 1948 annual meeting in Richmond. The scene of this year's meeting is the John Marshall Hotel.

Wisconsin.—The 78th annual meeting of the Wisconsin State Dental Society will be held in Milwaukee on March 30 and 31 and April 1.

INTERNATIONAL

POSTGRADUATE COURSE IS OFFERED AT U. OF TORONTO

The faculty of dentistry, University of Toronto, will present a one week postgraduate course in periodontology May 3 to 8. For further information concerning this course write to the Dean, Faculty of Dentistry, University of Toronto, 230 College St., Toronto 2B.

INTERNATIONAL DENTAL GROUP LISTS PURPOSES AND VALUES

The Fédération Dentaire International recently released a list of the purposes and values of the organization. They are as follows:

1. Promote an international dental congress every five years.

2. Maintain and strengthen the bonds of friendship between national dental societies and associations.

3. Encourage, in a general way, any activity that these societies and associations may advance that will contribute to dental science....

4. Collect, publish and keep professional documents and organize documentary centers, internationally.

5. Present all the various phases and advances in the field of dentistry by the best informed members of the profession and give a review of all the important findings that may occur between congresses.

6. Issue a monthly *International Dental Journal* in four languages, English, German, French and Spanish.

7. Make a definite contribution towards the rebuilding of our profession throughout the world and on the highest basis possible and restore dental services to their maximum effectiveness in wartorn countries.

8. Be available and prepared to render professional advice and assistance in the development of a proper professional approach to the solving of the many problems confronting the United Nations and all other professional groups striving for peace and the strengthening of the health and welfare of the peoples of the world.

ONTARIO FEATURES TRAVELING DENTAL SERVICE FOR CHILDREN

The Ontario division of the Canadian Red Cross Society will furnish free dental service to children in remote sections of Ontario by means of a completely equipped dental coach. The service is primarily for children of school and preschool age whose teeth are being neglected because of the scarcity of dentists in outlying parts of the province.

Red Cross nutritionists and the Junior Red Cross are cooperating with the Dental Committee of the Red Cross with lectures to parents on nutrition, handling the clerical part of the program and outlining the entire program to school inspectors. It is the intention of the Dental Committee that this service be educational as well as remedial. Where conditions are found to be poor, Murray Buchman, the traveling dentist in charge, and the Red Cross representatives will attempt to rectify the situation and to educate the public on the improvement of health.

GRANT IS PRESIDENT OF DENTAL ALUMNI ASSOCIATION

Edmund A. Grant of Toronto has been appointed president of the Dental Alumni Association of the Dental College, University of Toronto.

Dr. Grant was president of the Ontario Dental Association in 1941-1942, president of the Toronto Academy of Dentistry in 1933-1934 and director of dental services for Toronto in 1945. At present he is associate professor of public health dentistry at the University of Toronto. Recently Dr. Grant was made a fellow of the American College of Dentistry.

ELECT NEW OFFICERS TO ARGENTINE DENTAL GROUP

The following are the officers for 1948 of the Argentine Society of Dental and Maxillo-Facial Surgery of Buenos Aires: president, Manuel B. Galea; vice-president, S. Abel Sticco; secretary, Carlos Calloni; assistant secretary, Normando Quereilhac; treasurer, Hector Lombardo; voting members, Domingo Demarchi and Carlos A. Herrera.

CORDOBA DENTAL ASSOCIATION ANNOUNCES NEW OFFICERS

The officers and board of directors of the Cordoba Dental Association, Cordoba, Argentina for 1948 are: president, Florencio Ponce; vice-president, Aldo O. Carrer; secretary general, Rafael E. Amuchastegui; assistant secretary, Hermosina B. de Gacioppo; secretary of cultural relations, Jesus Osorio Sanchez; treasurer, Guillermo Buteler; voting members, Carlos D. Cabanillas, Horacio J. Acuna and Diego E. Rapela; alternates, Zenon E. Pastrana and Teobaldo A. Gotusso.

DENTAL EDUCATION

OHIO STATE UNIVERSITY OFFERS POSTGRADUATE COURSES

There are still a limited number of enrollments available for veterans and civilian dentists in postgraduate courses in dentistry being offered through The Post-Graduate Division of the College of Dentistry, The Ohio State University during the month of March. The courses, which are still open for enrollments, are as follows: children's den-

tistry, March 1 to 5; endodontia, March 8 to 12, and dental caries control, March 8 to 12.

These postgraduate courses were designed to enable dentists engaged in general practice to amplify their training in basic and clinical fields. They were made possible through the aid of a grant from the W. K. Kellogg Foundation. The courses will be given for five consecutive days and are limited to ten students. The charge for each course to civilian dentists is $50. Civilian dentists are required to send in a deposit of $25 with their applications.

As all of the courses come under the G.I. Bill of Rights, veterans who enroll in any of these courses must present their Certificates of Eligibility and Entitlement from the Veterans Administration when they register.

Applications should be filed through the office of Hamilton B. G. Robinson, director, The Post-Graduate Division of the College of Dentistry, The Ohio State University, Columbus 10, Ohio.

GEORGETOWN U. ANNOUNCES NEW GRADUATE PROGRAM

Courses in the science of dental materials offered by the Dental Materials Section of the National Bureau of Standards will be accepted as accredited work to the extent of twelve semester hours toward the master of science degree and twenty-four semester hours toward the doctor of philosophy degree by the School of Dentistry, Georgetown University.

In an announcement recently made by E. U. Condon, director of the Bureau, and John P. Burke, dean, School of Dentistry, Georgetown University, it also was established that original research conducted in the Dental Materials Section may be offered as material for a thesis by candidates for advanced degrees in the School of Dentistry.

Further information concerning this graduate program may be obtained either from the National Bureau of Standards, Washington 25 D. C. or the School of Dentistry, Georgetown University, 3900 Reservoir Road, N. W., Washington 7.

U. OF PENNSYLVANIA FEATURES GRADUATE COURSE IN CERAMICS

A postgraduate course in ceramics, especially designed to meet the demands of general practitioners, was begun on February 27 and will continue through part of the month of March at The Thomas W. Evans Museum and Dental Institute School of Dentistry, University of Pennsylvania.

The course consists of lectures, clinical demonstrations and table clinics. Each member of the class will be required to prepare a set of plaster models, demonstrating the different steps of jacket crown preparation and the most commonly used inlays. Also, each student will construct a porcelain jacket crown for a patient.

In order to give the greatest amount of individual attention to each practitioner, the class has been limited to six students.

U. OF ILLINOIS OFFERS REFRESHER COURSES IN ORAL SURGERY

A four week, full time postgraduate refresher course in oral and maxillofacial surgery was begun on February 16 at the College of Dentistry, University of Illinois. Succeeding classes in the same subject will be offered beginning May 3 and July 6.

The course, designed primarily for the general practitioner, consists of didactic and clinical instruction. Bernard G. Sarnat, acting head of the department of oral and maxillofacial surgery, heads the faculty for the course. Registration is limited to four students in each class. The course is offered under the provi-

sions of the G.I. Bill of Rights.

For more information about the course, write to Dr. Sarnat, College of Dentistry, University of Illinois, 1853 W. Polk St., Chicago 12.

TWO RECEIVE HONORARY DEGREES AT S. CALIFORNIA CONVOCATION

Fred D. Fagg, Jr., president of the University of Southern California, conferred honorary degrees on Willard C. Fleming, dean of the College of Dentistry, University of California, and Ernest G. Sloman, dean of the School of Dentistry, College of Physicians and Surgeons in San Francisco, at the golden anniversary convocation and alumni banquet of the Southern California dental college last November.

Dr. Sloman and Dr. Fleming were featured speakers at the program following the banquet, along with Dr. Fagg and Julio Endelman, dean of the dental school.

The conferring of these honorary degrees marked the first time that Dr. Fagg has been privileged to perform in such a capacity since taking over as head of the university.

ANNOUNCE REFRESHER COURSES IN CHILDREN'S DENTISTRY

Eight refresher courses in dentistry for children will be offered by the School of Dentistry, College of Physicians and Surgeons, San Francisco, during the school year 1948-1949.

Designed to meet the needs of practicing dentists in acquiring a better understanding of the child patient, the courses include operative technics and recent developments in caries control, anesthesia, pulp therapy, cavity preparation and restorations for deciduous and young permanent teeth. The classes are limited to an enrollment of ten practicing dentists. Each class is for a period of eight days.

Dentists who are interested in this refresher course should communicate with

Officials and honored guests at the golden anniversary convocation of the College of Dentistry, University of Southern California are: left to right, Julio Endelman, Ernest G. Sloman, Willard C. Fleming and Fred D. Fagg, Jr.

the dean of the college for information concerning the dates of the courses, tuition and eligibility.

ILLINOIS ANNOUNCES GRADUATE COURSE IN ORAL SURGERY

The office of the department of oral surgery at the College of Dentistry, University of Illinois, announces a two year, full time graduate course in the basic sciences, with limited clinical experience, carrying credit toward a master of science degree. Applications are now being accepted for September 1948.

For further information concerning this graduate course, write to the Graduate Division, College of Dentistry, University of Illinois, 808 S. Wood St., Chicago 12.

FEDERAL AGENCIES

VA ATTEMPTS TO REDUCE BACKLOG OF VETERANS AWAITING CARE

Veteran Administrator Carl R. Gray, Jr., has ordered an investigation to determine the best policy of reducing the backlog of more than 500,000 veterans awaiting dental and medical care throughout the nation.

In the Chicago area, alone, more than 50,000 veterans are awaiting dental treatment at government expense.

Among the reasons put forth to explain the lack of dental and medical care of veterans are an unexpected number of applications for service, shortage of Veterans Administration clerks, overload of work by local dentists and lack of funds.

PAUL B. MAGNUSON SUCCEEDS HAWLEY AS VA MEDICAL CHIEF

Paul B. Magnuson, nationally known orthopedic surgeon and closely identified with the reorganization of medical care in Veterans Administration hospitals, has succeeded Paul R. Hawley as chief medical director of the Veterans Administration, effective as of January 14, according to an official release by Carl R. Gray, Jr., administrator.

Dr. Magnuson has been associated with the Department of Medicine and Surgery of the Veterans Administration since its inception on January 3, 1946. In his first position as chief of the research and education unit, he organized and completed the residency training program for the professional personnel of the Veterans Administration. Also, he aided in establishing a comprehensive research program with regard to many of the more obscure ailments and diseases of veterans. Most recently he served the Veterans Administration as acting chief of professional services.

As the chief medical director of the Veterans Administration, Dr. Magnuson will continue to work closely with the former chief, Dr. Hawley, who as special assistant and adviser to Mr. Gray will assist in carrying out the medical program.

COST OF "SILICATE CEMENT" FILM HAS BEEN REDUCED

"Silicate Cement," the nineteen minute color motion picture with sound, produced by the National Bureau of Standards in cooperation with the Research Commission of the American Dental Association now may be purchased from the Bureau at a cost of approximately $82.79.

Formerly, the cost of the motion picture was $135, and prior purchasers will be reimbursed. The present price includes the reel and carrying case but does not include shipping charges. Films will be shipped with shipping charges collect.

Those interested in securing the film should write to the Office of Scientific Publications, National Bureau of Standards, Washington 25, D. C., for purchase applications.

ARMY AND NAVY

PROMOTE THREE DENTAL OFFICERS TO RANK OF REAR ADMIRAL

The promotions of Alfred White Chandler, Spry Owen Claytor and Clemens Vincent Rault to the grade of Rear Admiral were approved by President Truman on December 13. These naval officers were selected for promotion under the Officer Personnel Act of 1947, which marked the attainment of a long sought goal in naval dentistry. Dental officers now are accorded an opportunity to advance to flag rank equal to that given officers in any other naval staff corps.

The three new admirals have distinguished themselves with their long experience as naval dental officers. Rear Admiral Spry O. Claytor was graduated from the George Washington University School of Dentistry in 1917. He entered the Navy soon after graduation.

Rear Admiral Alfred W. Chandler was graduated from the University of Pennsylvania School of Dentistry in 1915 and entered the Navy in 1917.

Rear Admiral Clemens V. Rault was graduated from the School of Dentistry Loyola University, New Orleans, in 1918, and entered the Navy in the same year. He also received a Master of Science degree from the Dental School, Northwestern University in 1937.

Prior to the passage of the Officer Personnel Act in 1947, there was provision for only one rear admiral in the Dental Corps. The Act now provides that the number of rear admirals in the Dental Corps be in the ratio of 1 for every 200 dental officers on active duty. The American Dental Association supported the passage of the Officer Personnel Bill.

NEW LAW PERMITS DENTISTS TO ENTER REGULAR NAVY

Under the provisions of Public Law 365, an act to provide additional inducements to dentists and physicians to make a career of the United States naval and public health services, Navy dental officers on voluntary active duty and civilian dentists who meet required qualifications may be permitted to enter the regular Navy.

Dentists possessing the following qualifications may apply for appointments in the Navy Dental Corps:

Former dental officers who have resigned from the regular service, and are presently

Navy dentists, recently promoted to the rank of Rear Admiral, are: left to right, Spry O. Claytor, Alfred W. Chandler and Clemens V. Rault

engaged in civilian postgraduate training or practice for the improvement of their professional ability and standing.

Graduates of dental schools approved by the American Dental Association who have had specialized training in civilian institutions, such training having carried them beyond the statutory age limit of 32 years set for applicants who desire to enter the Navy Dental Corps by competitive examination.

Civilian dentists who possess exceptional academic training, scientific experience, and professional skill. Such dentists must have outstanding professional reputations and be fully qualified to perform duties requiring highly specialized training and experience in a special field of dentistry. They may be appointed for assignment to duties directly concerned with their specialty, but must have a definite realization of the integration of their specialty with other branches of naval dentistry, and have an understanding that the needs of the Navy may necessitate their assignment to duty not directly concerning their specialty.

Candidates will be judged on a number of qualifications, such as teaching experience, certification by dental specialty boards, number of years of professional practice, professional accomplishments, specialized training and former military service. The allocation of rank to successful candidates will depend on their academic age, professional standing and accomplishments.

Requests for additional information may be addressed to the Bureau of Medicine and Surgery, Department of the Navy, Washington 25, D. C.

NAVY DENTAL TECHNICIANS WILL RECEIVE SEPARATE RATINGS

Beginning April 2, as part of the postwar enlisted rating structure of the Navy, dental technicians will receive separate ratings. The establishment of separate dental ratings marks an advancement and an improvement in the status of enlisted naval dental personnel. The technicians will be assigned duties pertaining only to dentistry, and training courses for this personnel will cover those subjects related to dental duties.

General service dental ratings for peacetime will be: dental technician, dentalman and dental apprentice. Emergency service dental ratings, for use only during national emergencies, will be: general technician, prosthetic technician and repair technician.

APPOINT MINGES AND APPLETON AS HONORARY CONSULTANTS

Clyde E. Minges, president-elect of the American Dental Association, and J. L. T. Appleton, dean of the Thomas W. Evans Museum and Dental Institute School of Dentistry, University of Pennsylvania, recently were appointed as the first two honorary dental consultants to the Surgeon General of the Navy.

As honorary dental consultants, Dr. Minges and Dr. Appleton will be called upon by the Bureau of Medicine and Surgery to give advice on the formulation of professional policies and standards, as well as on other problems affecting the Navy Dental Corps.

U. S. NAVY ESTABLISHES NEW DENTAL CLINIC AT GUAM

Capt. Errol W. Willett, DC, USN, has been nominated as the first dental officer in command of the new United States Naval Clinic at Guam, Mariana Islands.

The new dental clinic was established under the authority of the Secretary of the Navy.

OFFER SPECIAL TRAINING DUTY TO DENTAL RESERVE OFFICERS

Training duty will be available to a limited number of reserve officers at the U. S. Naval Dental School, National Naval Medical Center, Bethesda, Md., during the period April 19 to 30, inclusive. The total number that can be ac-

commodated has been apportioned among the naval districts.

The training will consist of lectures and demonstrations in the field of naval dentistry and visits to Naval and Marine Corps activities of interest.

Requests for assignment to this training duty should be submitted to the commandants of the naval districts in which the officers maintain their official residences.

RESEARCH

FORSYTH DENTAL INFIRMARY RECEIVES RESEARCH GRANT

The Forsyth Dental Infirmary for Children of Boston is in receipt of a five year grant of $25,000 from the Charles H. Hood Dairy Foundation in support of a long term study of growth and development of the teeth and jaws in relation to the problem of malocclusion of the human teeth.

This study will attempt to evaluate the many variables that influence the structure and function of the teeth and jaws. The body build, growth rate, inheritance, socio-economic status, nutritional and psychologic factors will be stressed.

Participating in the study are the following members of the Forsyth staff: C. F. A. Moorrees, orthodontist; Stanley M. Garn, physical anthropologist, and V. O. Hurme, director of clinical research.

THE NATIONAL CANCER INSTITUTE AWARDS GRANTS FOR RESEARCH

Through grants totaling almost $45,000, made possible by the National Cancer Institute of the United States Public Health Service, nine major dental colleges will be able to participate in the development of teaching in the field of oral cancer. These grants will facilitate the teaching of pathology, diagnosis and therapy of oral cancer by helping to pay the salaries of instructors who will teach early recognition of cancer of the mouth to dental students.

The following dental colleges are scheduled to receive grants from the National Cancer Institute: School of Dentistry, University of Louisville; School of Dentistry, Loyola University, New Orleans; Harvard School of Dental Medicine; Tufts College Dental School; School of Dental and Oral Surgery of the Faculty of Medicine, Columbia University; College of Dentistry, The Ohio State University; School of Dentistry, University of Pittsburgh; School of Dentistry, Temple University, and College of Dentistry, University of Tennessee.

KANSAS DENTISTS PARTICIPATE IN SODIUM FLUORIDE PROGRAM

On July 1, 1947, a 2 per cent aqueous solution of sodium fluoride was made available, upon request, to Kansas dentists, by the Dental Hygiene Division of the Kansas State Board of Health.

During the first six months that this program has been in operation, 225 dentists, or approximately 25 per cent of the dentists in the state, have requested and received the solution, according to a report received from Leon R. Kramer, director of the division.

PUBLIC HEALTH

APPOINT DIRECTOR TO NEW GOVERNMENT RESEARCH INSTITUTE

William Henry Sebrell, Jr., has been named director of the newly established Experimental Biology and Medicine Institute in the National Institute of Health of the United States Public Health Service. The formation of the Institute is part of a wider organization of the National Institute of Health, of which Dr. Sebrell is associate director.

Dr. Sebrell is the present chief of the

Division of Physiology of the National Institute and is an authority in the field of nutrition.

The new research institute will combine the functions of the Division of Physiology and the Pathology and Chemistry Laboratories, thus permitting greater coordination of scientific investigations.

TRUMAN TO REVIVE HEALTH PROGRAM WITH MAY CONFERENCE

Oscar R. Ewing, Administrator of the Federal Security Agency, has announced that in response to a request from President Truman he is calling a national health assembly May 1 to 4 to set up national health goals for ten years.

An executive committee of twenty-four members, he said, would set up discussion panels on all phases of the health problem as basis for a report and program for cooperation, public and private, national, state, and local.

Objectives of the assembly.—He estimated that 700 to 800 persons would attend the health sessions in May.

Mr. Ewing said that a National Heart Institute should be established by Congress in the National Institute of Health, and that he was now formulating a bill for subsidizing medical education. Although some things could be done by legislation and subsidy, he said, much would have to come from cooperation in the communities.

Members of committee. — The following were appointed to the executive committee of the National Health Assembly:

Barry Bingham, editor and president, Louisville Courier-Journal; Mrs. J. L. Blair Buck, president, General Federation of Women's Clubs; Earl Bunting, chairman, National Association of Manufacturers; Miss Elisabeth Christman, secretary-treasurer, National Women's Trade Union League; Dr. Louis I. Dublin, second vice president and statistician, Metropolitan Life Insurance Company.

Also Judge Jerôme N. Frank, United States Circuit Court of Appeals; Albert S. Goss, President, National Grange; William Green, president, American Federation of Labor; The Most Rev. Francis J. Haas, Bishop of Grand Rapids; Miss Frieda Hennock, lawyer, New York City; Mrs. L. W. Hughes, president, National Congress of Parents and Teachers; Eric Johnston, president, Motion Picture Producers and Distributors of America.

Also Allan Kline president, American Farm Bureau Federation; Mrs. Mary Lasker, New York City; Mrs. David Levy, New York City; Dr. George F. Lull, secretary and general manager, American Medical Association; Mrs. Eugene Meyer, Washington, D. C.; Philip Murray, president, Congress of Industrial Organizations; Mrs. Anna M. Rosenberg, New York City.

Also Earl O. Shreve, president, United States Chamber of Commerce; Dr. Frank Stanton, president, Columbia Broadcasting System, Inc.; M. W. Thatcher, president, National Federation of Grain Cooperatives; Walter White, secretary, National Association for the Advancement of Colored People; Dr. Abel Wolman, consulting engineer, Johns Hopkins University.

LOS ANGELES COUNTY MAKES ANNUAL HEALTH REPORT

It is stated in the section on the Division of Public Health Dentistry in the 1946-1947 report of the Health Department of Los Angeles County that the chief objective of public health dentistry is to conserve and promote oral health in children through dental health education and periodic supervision of their teeth.

Children are accepted in any of the twelve dental clinics in the health districts for first contact between the ages of 2 and 7 years. After having been registered, the children are recalled every four months for examination and correction of defects, when necessary, at which time both children and parents receive dental health education relative to nutrition and home care of the teeth. Sixteen thousand children from families in the low income bracket received dental care in 1946-1947.

These dental clinics accept adults who have Vincent's infection, pregnant women, and occasionally, patients from medical aid districts for emergency care only.

The Division of Public Health Dentistry also sponsors a dental hygienist program which supervises the dental health of children in thirty-two schools in the county.

The staff of the Division of Public Health Dentistry consists of a chief public health dentist who, in addition to routine supervision, often is called on to address widely diversified groups on dental health education; five public health dentists, and a dental hygienist.

The recommendation for Los Angeles County is to equip all dental clinics with mobile dental x-ray units.

KANSANS RECEIVE MOBILE UNIT IN STATEWIDE DENTAL PROGRAM

As part of the statewide dental program in Kansas, the State Board of Health recently launched a new dental trailer, constructed for the purpose of advancing the research, education and dental care activities of the Division of Dental Hygiene.

This mobile dental clinic will be used to carry out special studies in the prevention of dental diseases, to aid schools, 4-H clubs and other groups in advancing their health education programs and to study special needs and render dental care in those areas of the state where such care is not presently available to children.

The trailer is 26 feet long and contains complete laboratory and operating room facilities, child's dental chair, x-ray equipment and a reception room. Construction of the trailer, equipment and tow car was financed through a special grant made by the Children's Bureau, Federal Security Administration to the Division of Dental Hygiene, Kansas State Board of Health.

Participating at the trailer dedication ceremony were Gov. Frank Carlson of Kansas; F. C. Beelman, executive officer, Kansas State Board of Health; Leon R. Kramer, director of the Division of Dental Hygiene; W. R. Bellinger, assistant director of the Division, and G. M. Hassur, the dentist in charge of the mobile unit.

WYOMING HEALTH BOARD IS SURVEYING COMMUNITY WATER

The State Board of Health of Wyoming has approved a plan to survey all important community water supplies in the state. Complete chemical analysis of water supplies soon will be available. So far the following cities have been discovered to have fluorine content in their community waters: Casper, 0.9 parts per million; Cheyenne, 1.0 p.p.m.; Douglas, 0.6 p.p.m.; Green River, 0.6 p.p.m.; Powell, 0.2 p.p.m.; Sheridan, 0.3 p.p.m., and Thermopolis, 0.9 p.p.m.

Available scientific evidence suggests that a fluorine concentration of 1.0 p.p.m. is well within the limits of safety and also assures the maximum protection against dental caries.

Among those participating at the Kansas State Board of Health trailer dedication ceremony were: left to right, G. M. Hassur, in charge of the unit, Gov. Frank Carlson, F. C. Beelman, Leon R. Kramer and W. R. Bellinger

MARTHA ELIOT IS RECIPIENT OF "PARENTS' MAGAZINE" MEDAL

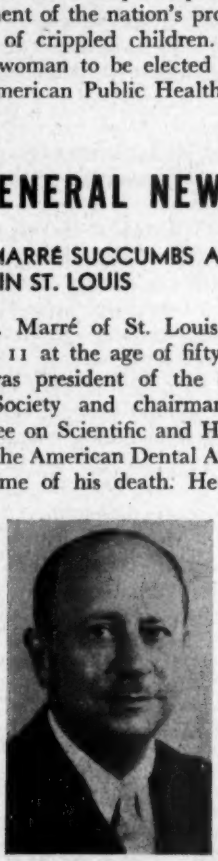
Martha Eliot, M. D., associate chief of the United States Children's Bureau, was honored on January 14 when she received the *Parents' Magazine* medal for her outstanding service to children, for her work as wartime director of the emergency maternity and infant care program (EMIC) and for her work, at present, as chief medical consultant of the International Emergency Children's Fund.

Dr. Eliot also has participated in the development of the nation's program for the care of crippled children. She was the first woman to be elected president of the American Public Health Association.

GENERAL NEWS

LEO F. MARRÉ SUCCUMBS AFTER ILLNESS IN ST. LOUIS

Leo F. Marré of St. Louis died on February 11 at the age of fifty-two. Dr. Marré was president of the St. Louis Dental Society and chairman of the Committee on Scientific and Health Exhibits of the American Dental Association at the time of his death. He also has been a member of the Committee on Military Affairs of the Association.



Leo F. Marré, well known St. Louis oral surgeon and exodontist, who died on February 11

Born in St. Louis on June 14, 1895, Dr. Marré received his public school education as well as his professional education in the St. Louis area. In 1917, he was graduated from the School of Dentistry, St. Louis University. He was a special lecturer on fractures of the jaw at St. Louis University and his full time practice was devoted to oral surgery and exodontia.

Dr. Marré saw service in both world wars. He was a first lieutenant in the U. S. Army Dental Corps in the first world war, and at the outbreak of World War II he re-entered the Army Dental Corps as a captain and rose to the rank of lieutenant colonel.

U. OF KANSAS CITY ALUMNI PLAN ANNUAL MEETING

The School of Dentistry, The University of Kansas City, will hold its annual spring alumni meeting on March 22 to 24 at the Continental Hotel, Kansas City, Mo. An operative seminar, featuring E. D. Shooshan of Pasadena, Calif., Harry A. True of San Francisco and John C. Metcalf of Alhambra, Calif., has been planned for the meeting by George Hollenback, president of the alumni association.

WOMEN'S GROUP SUPPORTS HOSPITAL DENTAL UNIT

The National Park College Alumnae Foundation of Chicago recently made its 1947 contribution to the support of the dental unit of the Children's Memorial Hospital of Chicago. The Foundation not only makes a yearly financial contribution to the dental clinic but also provides volunteer clerical service in the clinic from the ranks of its membership.

The work done in the clinic is that which comes up during the course of

general medical treatment, when the dental condition is a complicating factor. Robert Heupel, director of the dental unit, reported that extreme caries has been detected in all cases in which dental care was lacking.

APRIL 1 IS DEADLINE FOR REGISTRATION IN MARYLAND

According to an announcement recently issued by the Maryland State Board of Dental Examiners, "Beginning in 1948, any dentist holding a license to practice in the state of Maryland will be required to register annually before April 1."

Maryland dentists should write to Kyrle W. Preis, D.D.S., Secretary, Maryland State Board of Dental Examiners, 700 Cathedral St., Baltimore 1.

GENERAL ANESTHESIA SOCIETY TO MEET IN MARCH

The spring meeting of The American Society for the Advancement of General Anesthesia in Dentistry will be held on Monday evening, March 22, at the Midston House, New York. The scientific session will consist of the following talks: "National survey of undergraduate instruction in general anesthesia," by Leonard F. Prendergast of Cleveland; "Intravenous sodium pentothal anesthesia in the dental office," essay and motion picture by Myer Solomon of Williamsport, Pa.; "Aids in exodontia and oral surgery, with special reference to general anesthesia," essay and lantern slides by Harry J. Field of Newark, N. J.; and "Psychologic aspects of anesthesia," by Arthur N. Foxe, M.D., of New York.

NEW YORK HONORS COL. METZ FOR HIS ARMY SERVICE

Col. Karl H. Metz of White Plains, N. Y., has been awarded the New York State Conspicuous Service Cross for "exceptionally meritorious services in the Armed Forces of the United States." The award was made by the governor of New York through the adjutant general of New York, Brig. Gen. Amos T. Brown.

At present Col. Metz is finishing a course at the Medical Field Service School, Brook Army Medical Center at Fort Sam Houston, Texas.

HAWLEY IS NAMED CHIEF OF BLUE CROSS AND BLUE SHIELD

Paul R. Hawley, formerly the chief medical director of the Veterans Administration, has been named chief executive officer for the national Blue Cross hospital service and Blue Shield medical service plans. Dr. Hawley's new duties, which he will assume on April 1, will consist of directing the activities of the Blue Cross Commission of the American Hospital Association and the Associated Medical Care Plans or Blue Shield.

It is expected that Dr. Hawley's chief task will be to transform the Blue Cross and Blue Shield groups into a single national unit which will better meet the health needs of the public on a nonprofit voluntary basis. Dr. Hawley also will be concerned with public and professional relations as well as with the national enrollment problems of the two commissions.

ALPHA OMEGA FRATERNITY PLANS REVISION OF DIRECTORY

Samuel Resnick, executive secretary of the National Council of Alpha Omega Fraternity, recently announced that the 1948 edition of the directory of Alpha Omega Fraternity is being revised. Fraternity members are urged to send any corrections or changes in address to Alpha Omega Fraternity, Central Office, Land Title Building, Philadelphia 1.

CASES AND COMMENTS

Utilizing Discarded Burs. By Jerome J. Pavliger, D.D.S., Oakland, Calif.

Histologic studies of the teeth demonstrate that the inverted cone bur is peculiarly adapted for opening cavities. It can be used only once for this purpose. I have found that these discarded burs can be modified and sharpened with very little time or labor, and I have obtained startling results with their use in hundreds of cavity preparations. I have found that these modified cone burs are an improvement on new burs and that large size burs, for example, inverted cone No. 37, can be modified into various sizes suitable for cavities of various sizes.

If the end of a safe-ended inverted cone bur is sharpened by being held against a flat stone, new edges become available (Fig. 1). Repeated sharpenings are possible until the shank is reached. Modifications of the bibevelled inverted cone bur also can be obtained (Fig. 2). The size bur needed can be produced by changing the angles. Bibevelled burs are used for opening the slots of fissures, and safe-ended inverted cone burs are used to complete the cavity preparation by undercutting enamel.

Histologic studies of teeth show theoretically why these burs are so practical. Decay beginning in pits and fissures in which protection is secured by the depth of these pits or fissures does not spread on the surface outside of the fissures because all of the enamel surface around them is cleaned by the scouring of food in mastication.

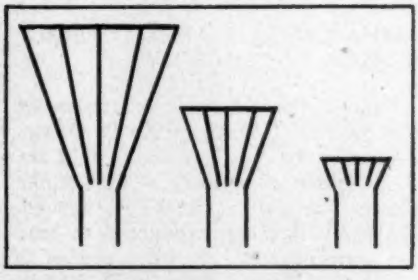


Fig. 1.—Sharpening of safe-ended inverted cone bur, showing how cutting edges become shortened with repeated sharpenings

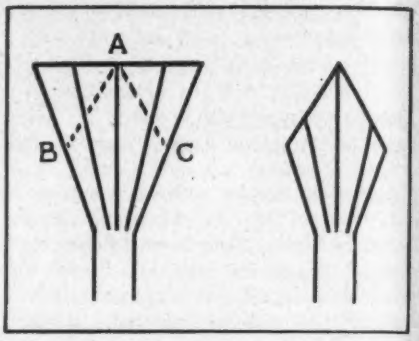


Fig. 2.—Method of modifying bibevelled inverted cone bur. The bur is held against a flattened stone until the new form (ABC) is obtained

The region of such caries in the enamel is represented by a cone with its base at the dentino-enamel junction. After decay penetrates the enamel, it spreads in every direction along the dentino-enamel junction. It also follows the dentinal tubules toward the pulp of the tooth, forming a conical area of decay in the dentin with the base of the cone against the enamel.

In the preparation of the cavity the enamel covering the area undermined by caries is removed and the cavity is extended into the dentin. Deep grooves are extended to points where a smooth finish of the filling can be made.

The theory of cavity preparation is that the injuries to the teeth produced by dental caries should be treated in the way that will best fit the remaining part of the tooth to receive a filling restoring the original form, that will give the tooth strength and that will prevent recurrence of decay in the same surface.—*1798 Excelsior Avenue.*

Reattachment and Bone Regeneration: Report of Case. By Oscar Bjorndahl, D.D.S., St. Paul.

A patient (male, aged 46, white) was seen on April 13, 1943. He complained of pain, tenderness and soreness in the region of the upper right cuspid.

Clinical Examination

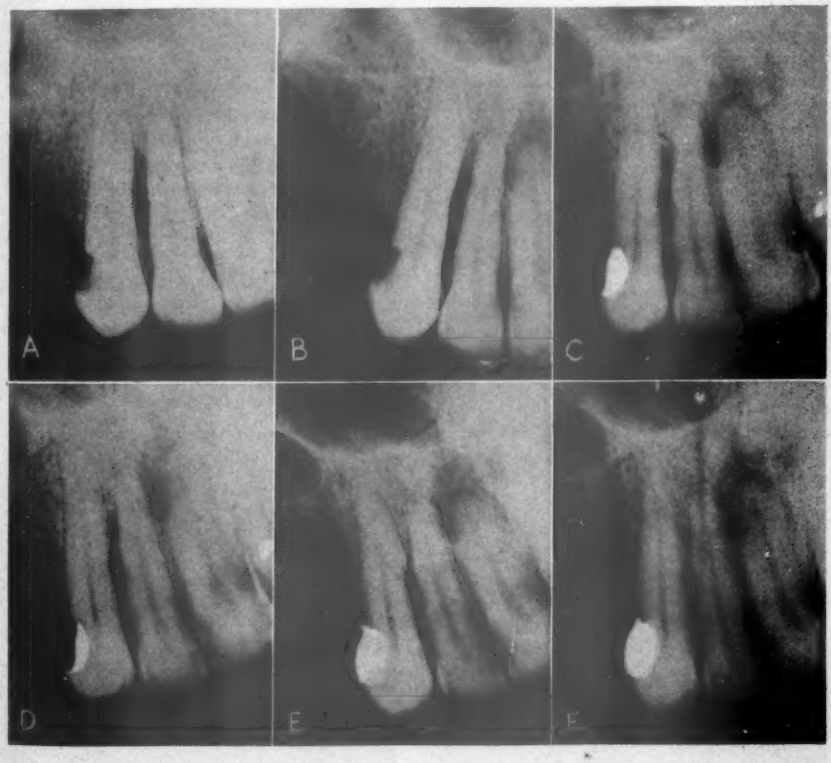
A fistulous opening into the apical region between the right cuspid and the lateral incisor was noted. The tissue from the apical region to the gingiva was hyperemic and swollen. Pus was expressed from both the fistula and the gingiva. There was moderate mobility of the upper right cuspid. Periodontal probing revealed a pocket 11 mm. deep. There were a tooth-bearing gold clasp supporting a vulcanite denture and a large cavity on the distal aspect of the cuspid.

Roentgenologic examination showed almost complete loss of alveolar bone between the cuspid and the lateral incisor (illustration, A). There was marked trauma on right lateral excursion and position. Careful checking eliminated the clasp as a traumatic factor.

Treatment

Light probing with a probe dipped in phenol was carried out to cause sloughing of the diseased tissue and drainage of the infected region. The patient was instructed to use a saline solution (½ teaspoonful of table salt to a glass of water) as warm as could be tolerated to increase blood supply and to maintain drainage. Each mouthful was to be held over the infected tooth. He was instructed to repeat this treatment every two hours, the purpose of the treatment being to relieve the pain and soreness.

On the following day the tooth was tender but not painful. The further use of a warm saline solution and finger massage was prescribed. The patient was instructed to return in four days.



A, Roentgenogram showing bone loss (April 13, 1943). B, Before final curetting; blood clot established (May 19, 1943). C, Bone rebuilding from gingival region (April 12, 1944). D, Further filling in of bone (January 23, 1945). E, Rebuilding of bone completed (March 16, 1947). F, Bone completely rebuilt; appearance of new healthy bone (May 3, 1947)

On April 18, the tooth was comfortable. Little pus was expressed. Mobility of the cuspid was graded 2 plus. Treatment consisted of grinding of the cuspid to eliminate trauma on right lateral excursion and position. Extensive curetting of both the hard and soft tissues, followed with a liberal application of phenol to pocket depth and cauterizing of the fistulous opening with phenol on a fine probe, was carried out. The patient was instructed in tooth brush massage.

The grinding and balancing were done to eliminate the causative factor. The curetting of the hard surface was performed to eliminate irritating factors, and the curetting of the soft tissues was performed to eliminate diseased granulation tissue. The phenol was intended to eliminate further the diseased tissue and also as a bactericidal agent.

The object was to start repair by eliminating the causative, irritating and bacterial factors, thereby hoping to establish physiologic balance and function of the tooth and surrounding tissue. The patient was instructed to continue brush massage and to return in two weeks.

On May 2, the tooth was in a much firmer position. More grinding was necessary for the relief of trauma on lateral excursion.

On May 19, a roentgenogram was made before treatment was undertaken (illustration, B). The tooth was firm, and there was no mobility and no pus. The tissue was normal in color and texture. The depth of the pocket was 10 mm.

With freshly sharpened curets a thorough and careful curetting was done of both the hard and soft tissues. A blood clot was established, and the patient was instructed not to brush or disturb this for two days.

Discussion

The purpose of treatment was to attempt reattachment of the tissue to the tooth and the rebuilding of bone.

As stated before, the objective of treatment on April 18 was to attempt to remove all factors that tended to produce disease and to make conditions favorable for healing. By waiting until May 19, when the tooth was firm and the tissues were clinically healthy, to do the final curetting, I was working in what I assumed to be a rather normal and healthy field. This final curetting produced a clean and surgically freshened wound in tissues that were already beginning to repair. In other words, I had produced a wound under conditions in which healing normally is expected to take place readily by blood clotting and organizing and laying down new tissue. Healing cannot be expected if the tissues are diseased and the pocket is filled with pus and debris. Such tissues also cannot be expected to retain and protect a blood clot when it once has formed.

In attempting the technic of reattachment, the chances of success are greater if everything possible is done first to restore the tooth and its tissues to normal function and then waiting a period long enough to allow the natural forces of healing to begin before final curetting and establishing the blood clot.

The roentgenograms show the progress of bone regeneration and response to treatment during a four year period.—*2267 Como Avenue West.*

Lower Third Molar in the Region of the Neck of the Mandibular Condyle.

By John W. Hallam, L.D.S., Liverpool, England.

A man, aged 51 years, gave a five day history of pain and swelling in the left parotid region.

Examination

On examination there was a hard tender swelling approximately 6 cm. in diameter obliterating the angle of the jaw and extending upward to the mastoid process. Trismus was marked, the patient appeared to be eden-

Fig. 1.—Unerupted wisdom tooth in region of condylar neck

Fig. 2.—Acrylic Gunning's splint with facial hook splint

tulous, and no swelling was apparent from inside the mouth.

Roentgenograms revealed an unerupted third molar in the region of the condylar neck (Fig. 1). There was some destruction of bone around the crown. In view of the position of the tooth, it was decided to remove it by an external approach. Since there was some risk of fracture of the neck of the condyle and possible involvement of the facial nerve, an acrylic Gunning's splint with a facial hook splint was made as a preoperative precaution (Fig. 2). The systemic administration of penicillin was started.

Operation

At operation the skin and deep fascia were reflected upward, after an incision below the angle. An ounce of pus was evacuated. This had lifted the parotid fascia off the outer table of the ascending ramus of the mandible, and a perforation of the bone was immediately apparent. After removal of a thin layer of cortical bone, the tooth was delivered readily by the use of Winter's exolevers. The wound was closed after insertion of a small ribbed drain. The drain was removed after two days, and the patient was discharged from the hospital five days later.—*31 Rodney Street.*

Impacted Lower Left Third Molar Displaced in Soft Tissue, With Attempted Removal. H. N. Magee, D.D.S., Oklahoma City.

A man, aged 22 years, who was a college student, was seen in the hospital forty-eight hours after an attempt had been made to remove an impacted lower left third molar. The patient said that the tooth had been lost in the attempted removal and that the dentist had been unable to locate it. He complained of severe pain, extensive swelling of the face and inability to swallow. There was a putrid odor from his breath. His temperature on admission to the hospital was 103 F.

Examination

On October 26, 1944, examination and roentgenograms revealed that the tooth was in the soft tissue under the lingual border of the lower left side of the mandible in an inverted position (see illustration). Aside from the pain and discomfort, the patient was in good condition.

Surgical Treatment

On October 27, with the patient under the influence of ether, the tooth was removed. The incision was made from the internal oblique line forward to the lingual surface of the third molar socket, extending through the region of the third molar socket to the second bicuspid. The flap was laid back, and by careful probing the tooth was located in the soft tissue. By the use of suction to clear the field and a blunt looped curet, the tooth was engaged and removed. The socket was packed with iodoform gauze saturated with petrolatum, and the flap was closed and sutured lightly. The pack was removed at the end of forty-eight hours, and the suture was removed in three days.

Postoperative Course

The treatment after operation consisted of irrigations of the mouth with a warm saline solution every forty-five minutes for two days

Roentgenogram showing lower left third molar in an inverted position

during the patient's waking hours, codeine grain ½ every four hours as necessary for pain for two days, sulfathiazole grains 15 every four hours for four doses and then grains 7 7/10 until further orders, and ice caps to the jaw for the first day only. The patient's recovery was uneventful. The temperature returned to normal the evening of the second day, and the patient was dismissed from the hospital on the fourth day.—*528 North West Twelfth Street.*

Facial Paralysis Coincidental With Carious Molar. By Normand Jean Paquette, D.D.S., Waterville, Maine.

On August 21, 1945, a man, aged 44, came to me to have his upper right second molar filled. I advised extraction of the tooth, but the patient did not consent, so a zinc oxide and eugenol filling was placed. At this time I also advised the extraction of the lower left first molar.

On December 25, 1945, the patient was suddenly seized with pain in the upper part of the left eye and the upper left side of the mouth. He saw in the mirror that the left side of his upper lip and the upper left lid were drooping. There was intermittent pain until December 31, when he consulted me. On the morning of December 31, pain was also present in the anterior triangle of the left side of the neck.

Roentgenograms were taken of the upper left first bicuspid and second molar and the lower left first molar (Figs. 1 and 2). There was a large cavity in the first molar and the pulp had been exposed for a long time. On the basis of the roentgenograms I tentatively

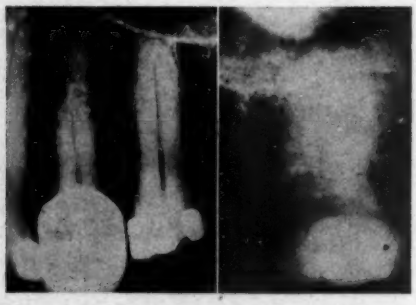


Fig. 1.—Roentgenograms of upper left first bicuspid and second molar

Fig. 2.—Roentgenogram of lower left first molar

decided against extraction of the upper teeth and extracted the lower left molar. I asked the patient to note if and when the droop left him and to return immediately. One week later, not having heard from the patient, I telephoned him and learned that the paralysis was gone.

On May 10, 1946, the patient came to my office to have the upper right second molar extracted. After questioning the patient regarding the paralysis, I established March 1, 1946, as the probable date for complete loss of the paralysis.—*402 Professional Building.*

Hereditary Cysts. By Henry M. Bigelow, D.D.S., Chicago.

In reviewing the texts of oral surgery and pathology, I have not been able to find a statement concerning the relation of heredity to cysts. In my own practice, there has been but one family in which there would seem to be little doubt that heredity played a part. Perhaps even in this one family the occurrence of the cysts in several members was a matter of chance. However, in all persons the tumors were similar in size and location. Although these few cases prove nothing, they are at least unusual and interesting.

The family consists of a mother, aged 50 years; a daughter, aged 21, and a son, aged 17. The father and grandparents are dead, and no information is available regarding cysts in any of them.

A brief résumé is given concerning each

patient, and roentgenograms are presented to show the similarity of the pathologic condition.

Case 1

The mother was referred to me by her physician because her face was markedly swollen in the left parotid region. According to her history, she had been operated on for cysts of the left and right sides of the mandible. She had had three unsuccessful operations on the left side and two on the right side, the

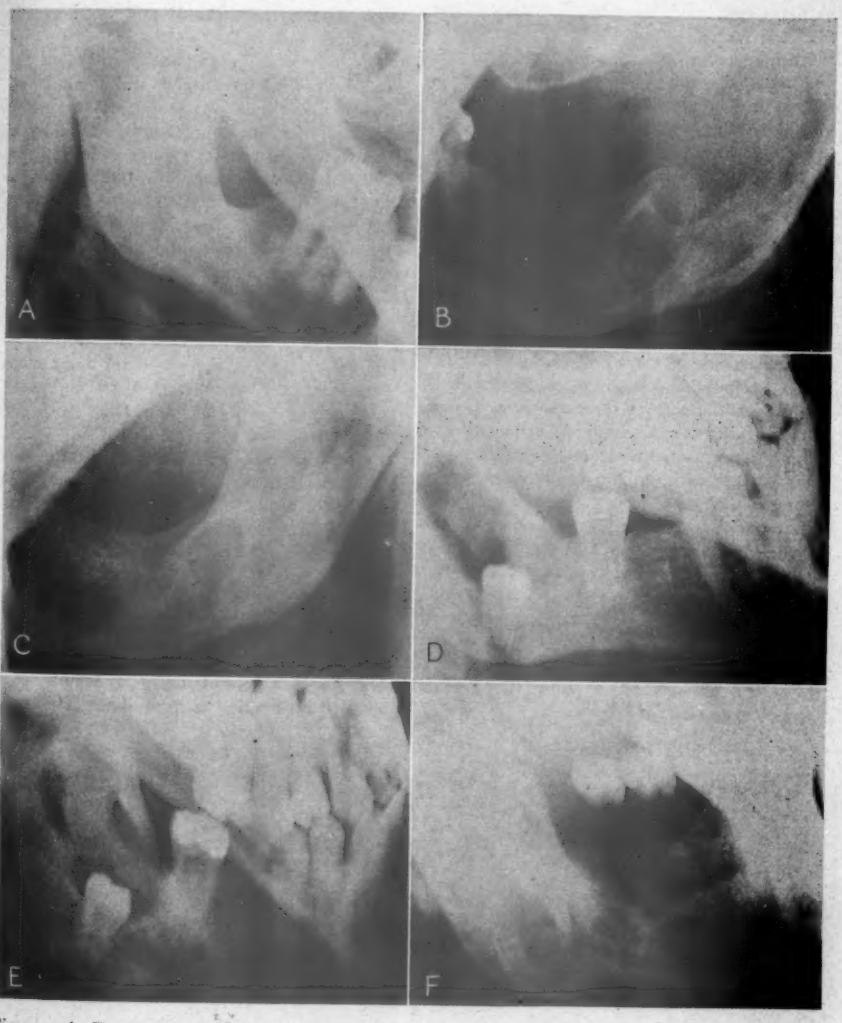


Fig. 1.—A, Roentgenogram of right mandible of mother, June 16, 1946. B, Left mandible of mother, June 16, 1946. C, Complete calcification of cyst in ramus and partial calcification of cyst in bicuspid region. D, Roentgenogram of right mandible of daughter, March 22, 1946. E, Increased calcification, April 26, 1946. F, Right mandible, April 19, 1947. Complete calcification. Upper teeth and lower molar removed. Upper denture in mouth

second one of which was successful. The last operation had been performed about three years before her visit to me, and the procedure performed had been enucleation of the cysts. The other personal and family history was negative. The patient had had a thorough physical examination two weeks before, and no pathologic condition other than that in her face was found.

Roentgenologic examination on June 16, 1946 showed the right ramus of the mandible to be somewhat rarefied (Fig. 1, A). The region had the appearance of recalcification after removal of a cyst. There was destruction of the entire left ramus of the mandible except for a thin portion of bone about 1 mm. thick along the posterior border (Fig. 1, B). In this roentgenogram a cyst-like area also is seen below the lower left first bicuspid.

On June 22, 1946, an operation of the Partsch type was performed on the left side. An opening about 2.5 cm. long and 1.5 cm. wide was made in the usual manner. A large amount of fluid (about 35 cc., estimated) gushed forth as soon as the cavity was opened, and the facial contour returned to normal.

The patient was given a water syringe and instructed to irrigate the cavity with water after each meal to keep it clean. The region was examined at intervals to make sure the opening remained patent, and the fissure gradually exfoliated. The cyst membrane was enucleated on October 12, 1946. The roentgenogram made on March 21, 1947 disclosed good calcification of the ramus, with almost normal contour (Fig. 1, C). This case illustrates the advisability of using the Partsch type of operation for large cysts.

Case 2

The daughter came to me from her dentist for examination on March 22, 1946. The personal history was negative except for the presence of a shadow in a dental roentgenogram. Additional roentgenograms revealed the presence of a large cavity containing an unerupted tooth in the right ramus and body of the mandible (Fig. 1, D).

On March 26, 1946, an operation of the Partsch type was performed, and about 10 cc. of clear cystic fluid was found. A large opening was made into the mouth, and the patient was given a water syringe to irrigate the cavity after each meal. The tooth was seen but was left undisturbed.

A roentgenogram on April 26, 1946 disclosed increased density and thickening of the remaining bone about the cyst (Fig. 1, E).

The unerupted tooth was removed on May 13, 1946, and the cavity was left open.

The cystic region did not fill in but remained about the same size for some time. Therefore, on November 23, 1946, an enucleation of the remaining membrane, with closure, was performed.

After this procedure, roentgenograms were made about every six weeks, and the cavity was found to be filling rapidly. A roentgenogram made on April 19, 1947 appeared to be almost normal (Fig. 1, F).

Case 3

The son had peculiar sensations in the mandible and was referred to me by his mother.

The personal history was essentially negative. Roentgenograms made on May 1, 1947 revealed destruction of most of the ramus and

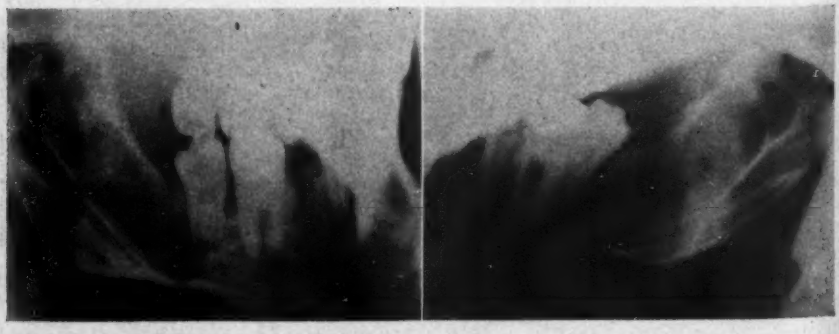


Fig. 2.—Roentgenograms of mandible of son, May 1, 1947

body of both sides of the mandible (Fig. 2).

On May 16, 1947, the Partsch type of operative procedure was performed, and normal cystic fluid was found. At the present time, the cavities are filling in, but roentgenograms are not submitted because the change shown is not great enough to warrant their publication.

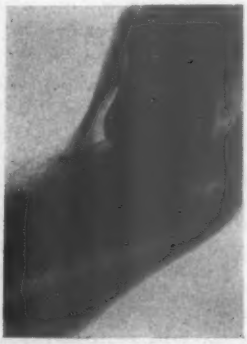
Conclusion

In 3 members of a family six large cysts were found. Because of the similarity of size and location, one can believe heredity to be a factor.—*1 North Crawford Avenue.*

A Triple Mandibular Impaction. By Edward B. Zlonczewski, D.M.D., and Francis L. Zlonczewski, D.M.D., Jersey City, N. J.

The patient, a woman 23 years of age, visited our office for a routine dental examination.

Oral examination revealed no abnormality in rest position, but when the lower jaw was opened there was pronounced lateral excursion of the mandible. The patient vaguely recollected an injury to the jaw in childhood for which no treatment was instituted. Intraoral roentgenograms revealed three impacted molars in the mandible on the left side (see illustration). The patient disclaimed knowledge of loss of any posterior teeth on that side of the mouth. The ridge formation on that side was normal. There was no pain or loss of function. Extra-oral and occlusal roentgenograms were taken. The lateral roentgenograms showed three molars imbedded in the ramus. The occlusal roentgenogram did not show any of the impacted molars, thus proving that the impacted teeth were located in the ramus of the mandible. The roots of the lower or most inferior tooth appeared to be fairly well formed and showed a close proximity to the inferior border of the mandible near the angle. The other two molars showed no root formation, although the cusp formation of these two teeth definitely was established.



Three impacted molars in mandible on left side

Comment

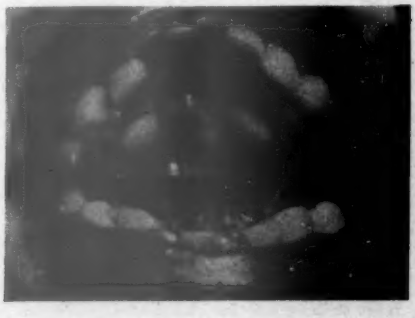
No surgical procedure was instituted because of (1) the close proximity to the mandibular nerve, (2) a possible surgical fracture of the mandible, and (3) the fact that there was no discomfort or loss of function.—*562 Jersey Avenue.*

Mandibular Anomaly. By Sidney Aronoff, D.D.S., Chicago.

The accompanying photograph shows an anomaly found in a woman patient.

Bilateral growths, which are apparently cartilaginous or bony, project lingually from the mandible in the region of the lower first bicuspid. They extend approximately 10 mm. from the lingual border of the mandible, about 3 mm. below the alveolar crest, and are about 4 mm. thick at their base. The growths are covered with smooth mucous membrane.

No pain, discomfort or tenderness is experienced by the patient. She believes that she has had these growths since birth. She has not noticed any perceptible increase or decrease in their size within the last twenty years.—*1642 East Fifty-Sixth Street.*



Bilateral growths of mandible

BOOK REVIEWS

Public Health in a Changing World. By the Bureau of Health Education, Jefferson County Department of Health (Alabama). John K. Williams, Director. 133 pages, with 16 illustrations.

In this book the Jefferson County Department of Health, Ala., one of the outstanding municipal and county health departments in the country, describes its health activities from 1917 to 1946. The book also contains a descriptive account of the progress made by medicine, economics and public health during the past three decades.

A comparison of public health achievements with accomplishments in various fields shows that medicine has kept abreast of other swiftly moving sciences.

Public health service has expanded by the continual extension of its activities into new areas. Standards have been established for personnel in the various fields. The Social Security Act, Hospital Survey and Construction Act, Mental Hygiene Act, school lunch program and similar developments have increased the responsibilities of public health departments.

Social progress is mentioned as being directly associated with medical facilities. Communities have made great strides in protecting people against lack of work, ill health, ignorance and want. Many phases of chemistry, spectroscopy and atomic physics are yet unexplored to a large degree, and through their development a new era can be realized if discoveries are used for the advancement of health and science rather than for destruction.

Numerous clinics have been established for the people of Jefferson County. Prior to 1946 this type of health service was free to those who could not obtain it otherwise. To help people to help themselves, a token payment for clinic services has been expected since November 1946. This places a responsibility on the underprivileged group, and the small payment makes them feel that they are contributing toward their own welfare.

From the statistical evidence there has been a definite increase in all services in Jefferson County in 1946 as compared with 1945. The most striking one for the dental profession is the establishing of a Bureau of Dental Health, which indicates a recognition of the tremendous need for an expanded dental program. Those interested in public health can profit by studying the contents of *Public Health in a Changing World*. They will obtain an overall picture of public health problems today as compared with those of a few years ago, and they also can benefit by following Jefferson County's method of solving these problems—*John E. Chrietzberg.*

Pharmacology and Experimental Therapeutics: A Survey for 1941-1946. By Hamilton H. Anderson, Fumiko Murayama and Benedict E. Abreu. 368 pages. Price $6.50. Berkeley and Los Angeles: University of California Press, 1947.

This unusual book is interesting and easily read. It consists of an alphabetical listing of drugs under the names most commonly applied to them. Thus, some of the names are exclusive trade designations and others are generic.

Under the name of each drug, brief abstracts of pertinent pharmacologic and therapeutic publications which appeared during the years 1941 to 1946 are given.

This book will be especially useful to anyone who has been out of touch with the scientific literature since 1941. For instance, many dentists who served for long periods in isolated areas during the war would benefit from its perusal. Even those who have read widely in recent years might find some references which they previously had overlooked.—*Donald A. Wallace.*

Pharmacology and Pharmacotherapeutics for Dentists. By W. H. O. McGehee, M.D., D.D.S., F.A.C.D., and M. W. Green, Ph.G., B.S., Ph.D. Third Edition. 536 pages. Price $6.50. Philadelphia: The Blakiston Company, 1947.

This text is comprehensive, but naturally it does not attempt to cover as broad a scope as the large works in general pharmacology. The information is reliable, and the editing is good. Discussions of the newer drugs are conservative.

Distinction is not always made between generic names and exclusive trade names for pharmaceutical preparations.

A wide variety of formulas and suggestions for prescriptions are offered. Many of these are excellent, but some are of doubtful value, and the warnings given are not always entirely adequate. For example, arsenical formulas are included in the section on Vincent's stomatitis, despite the lack of evidence to support their usefulness in the treatment of that condition. It is stated elsewhere in the book that additional research is necessary before the value of organic arsenicals in dental therapeutics can be determined definitely. Chromic acid preparations are listed without a statement that they may dissolve tooth structure. Despite these criticisms, the book appears to this reviewer to be among the best in its field.—*Donald A. Wallace.*

A Symposium on the Effects of Soil Elements on Food. By T. J. Brooks. Florida State Department of Agriculture, Tallahassee. Pamphlet No. 123, New Series. 175 pages. St. Augustine, Fla.: Record Press, Inc.

This pamphlet is a compilation of selected articles on the effects of soil elements on food. A four-chapter introduction, assumedly written by Brooks, indicates a well balanced understanding of the status of the problem.

The excellent summarization in the first four chapters is followed by a curious mixture of writings by lay reporters, physicians, professors of soils, allied scientists, commercial advertisers and newspaper editors. Only three of these are strictly scientific, and only one bears directly on the subject as delineated by the title of the pamphlet. This article is a detailed review by Georgian Adams and Sybil Smith of the research carried on at a federal experiment station on the vitamin value of foods as affected by various factors. These writers conclude that "natural variations in vitamin content of food as harvested are the result of climate, soil, variety, degree of maturity, and selective concentration in different parts of the plant." The most likely deduction to be made from most of the other writings reproduced in the pamphlet is that soil is the only significant factor influencing the nutritive value of foods.

The second scientific report is of research by William Albrecht and associates on the effects on sheep and rabbits of consumption of hay raised on soils of different calcium treatment. Albrecht found no great differences in the concentrations of calcium or phosphorus in the hays; yet the experimental findings led him to conclude that "limed hay apparently altered growth favorably."

The third scientific presentation included is not directly related to the subject. It covers material of interest to anyone associated with a department of agriculture because it reports experimental results in rat nutrition, comparing corn oil and butterfat feeding.

Only 71 of the 175 pages are scientifically related to the subject. Most of the material is either commercial exploitation or emotional discussion based on evidence which is undoubtedly weak. Frequently references are made to the dental relations but only in general statements, most often not substantiated by research. Therefore the value of this pamphlet is limited so far as dentistry is concerned.—*Dorothéa F. Radusch.*

Technical Dictionary (English-French and French-English). Compiled by Francis Cusset. 590 pages. Price $5. Brooklyn: Chemical Publishing Company, Inc., 1946.

Monsieur Cusset, civil engineer for the Society of Mines of Valleroy, France, has compiled a practical reference dictionary for use in reading technical French texts. This is a work applicable to a highly specialized field and is not in any sense a substitute for the general reference dictionary.

Approximately 30,000 entries, presented in English-French and French-English sections, make the volume equally useful for translators of both languages. Technical terminology pertinent to the field of industrial research, particularly in the realms of chemical and mining engineering, is covered exhaustively. Related words and phrases are grouped together in detailed listings. For example, there are twenty expressions employing the word "chain," such as chain (belt), chain (link), chain (detached link) and chain (surveyor's). Under the word "hoist" twenty-six listings appear; "hydraulic power and machinery" has sixteen references.

The book is light, compact and easy to handle, and the print is large enough to be read easily.—*Martha Ann Mann.*

CURRENT LITERATURE

Signs of Progress in Dental Health. Allen O. Gruebbel. J. Pub. Health 37:1160, September 1947.

The author outlines the current actions and proposals of the Council on Dental Health which, if successful, will stimulate the dental profession to utilize more adequately the resources available for the promotion of dental health.

The American Dental Association will sponsor a series of dental health workshops so that individual dentists and state and local dental health councils may have the opportunity to examine critically through group discussions a number of important questions, and make recommendations for action on them.

An annual conference of state councils will be held in conjunction with the annual A.D.A. meeting to afford an opportunity for state and component societies to exchange opinions and to enter into free discussion on the policies of the A.D.A. as well as on the aspects of national dental health planning.

A school dental health manual has been prepared as a guide to the establishment and maintenance of dental health programs in elementary and secondary schools. This manual outlines accepted school health practices, technics of organization and administration, and the responsibilities of dentists, school officials, health officers and nurses in conducting programs.

The A.D.A. has recommended the appointment of dental representatives from each of the member nations as dental advisers to the delegates of the World Health Organization which is to be established under the auspices of the Economic and Social Council of the United Nations.

A restatement of dental health objectives includes, among others, the official action of the A.D.A. recommending that there be established in all states suitable practice acts for dental hygienists.

The A.D.A. intends to augment its services to publishers of public school textbooks by employing a competent dental health education specialist who will be assigned the task of editing and evaluating the dental context of publications for school children.

The Council on Dental Health will attempt to secure the assistance of state dental societies in taking suitable action, through legislative measures if necessary, to obtain higher rates of pay for dental positions in state and local health departments.

Unfortunately, because of the appraisal forms now in use, the accomplishments of workers in the dental health field are reported ineffectively in the *Health Practice Indices*. Therefore, the Council on Dental Health is requesting the assistance of the Dental Health Section of the American Public Health Association and the American Association of Public Health Dentists in the adoption of recommendations for the improvement of the dental health evaluation schedule used in the study and appraisal of community health programs.—*James Springer.*

Dental Caries in the Cotton Rat. IX. Effect of Milk Rations. E. Potts Anderson, J. Knox Smith, C. A. Elvehjem and P. H. Phillips. Proc. Soc. Exper. Biol. & Med. 66:67, October 1947.

The authors investigated the effect of various milk rations on the rate of growth and on the incidence and extent of dental caries in the cotton rat. Animals fed on milk alone grew less than those receiving control ration 802, a special caries producing diet. Growth was somewhat better when supplemental carbohydrates were added to the milk, although it was still less than that of the control animals. Rats which were fed ration 802 plus milk grew slowly at first, but eventually their growth was very nearly the same as that of the controls receiving only the dry ration.

From the data it appears that a diet of liquid whole milk is protective against dental caries in the cotton rat, and that even in the presence of fairly high levels of fermentable sugars, it exerts a protective action. The protection is less, but evident, when a caries producing dry ration is fed in addition to the milk.

Since it is probable that such protection is the result of a combination of factors, it is difficult to speculate on the mechanism involved. The differences in caries scores between the rats fed only a liquid diet and those

receiving dry ration in addition suggests that the physical state of the ration may play a role in the protective action. In the liquid diet carbohydrates were consumed in the dissolved state, and the protection might be attributed to a lack of mastication or to the fact that the carbohydrates probably remained in the mouth for a comparatively short time.

The lower growth rates of the animals on the liquid diet, as compared with the rates of the control animals, indicate that a difference in caloric intake also may have been a contributing factor.

It is possible that the fat, which exists in a relatively free state in milk, forms a mechanical coating on the tooth surface or on the particles of food, thus protecting against bacterial action. Inadequate investigation has been made of the effect of milk on the growth and activity of micro-organisms associated with dental decay, and an inhibitory effect through this channel might be possible.

Other conditions of the oral environment, such as pH, also might play a role. Further studies are in progress.—*James Springer.*

Dental Caries Prevalence and Tooth Mortality—A Study of 24,092 Georgia Children in Twelve Communities. Thomas L. Hagan. Pub. Health Rep. 62:1757, December 19, 1947.

About 25,000 children in several Georgia communities were studied from the standpoint of prevalence of caries in permanent teeth and of the resultant tooth mortality. Such factors as age, residence and economic level were considered in relation to these rates, and a brief discussion of the possible effects of these variables is presented. In general, the findings lead to the following conclusions:

1. The prevalence of dental caries in permanent teeth varies in the different places studied.

2. The annual increment of dental caries in permament teeth also varies from place to place.

3. No significant variation in caries experience can be attributed to economic status.

4. The prevalence of dental caries in permanent teeth may be increasing.

5. The tooth mortality rate of a community adheres quite closely to the relative pattern established by the rate of caries attack, except in those places where dental health promotion is carried out extensively.

6. Persons in the higher economic strata have significantly lower tooth mortality rates than persons in the lower economic levels, except where concerted efforts are made to save teeth by dental care.—*James Springer.*

Oral Environment and Fluorine. Gerald J. Cox. Am. J. Pub. Health 37:1151, September 1947.

The author presents a thorough, comprehensive review of the literature on fluorine and dental caries, summarizing the essential points.

Although the mechanism by which fluorine protects the teeth from dental decay remains unknown, there are two schools of thought on the subject: 1. Oral environmentalists believe that fluorine prevents caries by its action on environment. 2. Nutritionists believe that fluorine renders the structure of the enamel caries-resistant by nutritive mechanisms, but they have not yet declared fluorine an essential factor in caries control.

Large scale experiments now are being conducted to determine the effects on dental caries of addition of fluorine to the community water supply. Data from these studies will aid in deciding to what degree fluorine acts as a nutritive element and as a factor in providing a desirable oral environment.—*James Springer.*

Effect of Fluorides in Drinking Water on Teeth. T. Ockerse. J.A.M.A. 135:1167, December 27, 1947.

Dental surveys conducted in various parts of South Africa showed that the deciduous teeth of children whose mothers drank water containing up to 10 parts per million of fluorine during gestation and lactation were not mottled but were remarkably free from caries.

Albino rats were given 100 p.p.m. of fluorine in the drinking water during gestation and lactation, and their young were placed after weaning on a standard caries-producing diet without fluorine for eighty days. The young rats showed no mottling of the incisors, but had considerably less caries than rats whose mothers did not receive fluorine.

Although most of the fluorine is excreted in the urine, some is deposited in the bones of the mother and the fetus, and it is presumed that optimum amounts are withdrawn from this supply during calcification of the teeth.

The diet of the mothers who drank up to

10 p.p.m. of fluorine was high in protein. In experiments with rats it was found that the young of mothers who were placed on a high protein diet during gestation and lactation had less caries than rats whose mothers were placed on a low protein diet. A combination of a high protein diet and 100 p.p.m. of fluorine in the drinking water of the mother rats gave almost complete caries immunity to the young.—*L. E. Klinefelter.*

The Growth of the Odontoblasts of the Incisor Tooth as a Criterion of the Vitamin C Intake of the Guinea Pig. E. W. Crampton. J. Nutrition 33:491, May 10, 1947.

Numerous workers have described the radical changes which occur in the incisor tooth of the scorbutic guinea pig, and these changes have been used in subjective assay methods as an index of the vitamin C intake of young guinea pigs. In 1940, an objective method of assay was proposed by Boyle, Bessey and Howe, based on their finding that the width of the dentin layer of the incisor varied with the intake of vitamin C.

This method appeared to avoid the problem of assessing the degree of tooth damage, a difficulty inherent in earlier tooth assay methods. In examining the teeth of guinea pigs on varying intakes of ascorbic acid, Crampton and his associates were impressed with the clear-cut and easily measured differences in length of the odontoblast cells.

Experimental data are presented to illustrate the efficiency of this technic.—*Hyman Goldberg.*

Experimental Investigations of Parodontal Disease in the Ferret and Related Lesions in Man. (2) Gingival Hyperplasia Due to Epanutin Therapy. J. D. King and A. P. Gimson. Brit. D. J. 83: 148, October 3, 1947.

Diphenylhydantoin sodium (Dilantin Sodium, or Epanutin) has proved to be an effective anticonvulsant in the treatment of epilepsy. Gross gingival hyperplasia has been reported frequently as appearing in patients receiving this drug. The author believes that the production of hyperplasia is partially dependent on local irritative factors.

Using an unspecified number of female ferrets, which were divided into two groups, the author placed one group on an adequate soft diet and added daily a 3 inch length of horse rib with a small amount of attached meat. The other group received the same diet, without the supplement of rib. All of the animals were given 0.4 to 0.8 mg. of diphenylhydantoin sodium a day by mouth.

In the animals on the bone-free diet there developed within fourteen weeks "typical epanutin hyperplasia as well as tartar formation." Those animals which received the bone supplement remained free from calculus and gingival lesions.

It is suggested that the gingival lesions associated with the use of diphenylhydantoin sodium can be prevented by "adequate friction of tooth and gum." The results also seem to support the view that this type of hyperplasia tends to occur more readily if predisposing factors such as local irritative deposits of calculus are present.

In treating this condition in a young girl, King performed a gingivectomy and has advocated the chewing of sugar cane in the hope that the friction and massage will prevent recurrence.—*David F. Mitchell.*

Habitat of Endameba Buccalis in Lesions of Periodontoclasia. Charles C. Bass. Proc. Soc. Exper. Biol. & Med. 66:9, October 1947.

The author reports on the habitat of Endameba buccalis in gingival lesions associated with periodontoclasia. The method employed to discover the parasite consists essentially of microscopic study of material removed from various locations on extracted teeth which have been stained to facilitate identification of the structures and material present. A dissecting microscope and delicate micro-instruments are used in the study.

E. buccalis inhabits the outer part of the filamentous bacterial film on the tooth within the periodontoclasia lesion. There the organisms are protected and live, grow and multiply among the strands and fruiting heads of leptotrichia, principally Leptothrix falciformis.—*James Springer.*

A Merry Medicine for the Teeth (ca. 1520). Curt Proskauer. Bull. Inst. Hist. Med. 21:102, January-February 1947.

Around 1490 "Le debat de l'homme et de la femme," written in verse form, appeared in Lyon (France) without the "Merry Medicine for the Teeth," which was added later. The author, Guillaume Alexis, was a French

monk who wrote a series of religious, moralistic and satiric poems castigating the social evils and depravities of his time. The "Merry Medicine for the Teeth" was one of two satiric poems appended to an edition of "The Dispute" which appeared around 1520. The author of these two poems was not Guillaume Alexis, and remains unknown.

The prescriptions of the "Merry Medicine for the Teeth" are senseless and bawdy, and contain nothing in the slightest degree useful for the care of the teeth or relief of pain. Its significance for dentistry and medicine is that, like other forms of contemporary literature, it acted to promote a recognition of the worthlessness and danger of the medical recipes that were so popular during that time.—*Hyman Goldberg.*

Nutrition and Dental Disease. Allison G. James. Ann. West. Med. & Surg. 1:277, September 1947.

The author reports on the important relations between the diet and the oral conditions of 50 patients in his practice of general dentistry.

Most pathologic lesions of the oral cavity may be classified as (1) periodontal disease —lesions or degenerative changes of the supporting and investing structures of the teeth, (2) dental caries—destructive lesions of the tooth structure or (3) malformation of facial bones and dental arches.

The relation of the incidence of dental caries to the use of refined and concentrated carbohydrates is demonstrated by clinical control of caries through restriction or elimination of sugars in the diet. Malformation of jaws and facial bones is the result of injuries to the germ plasm in the parents prior to conception. Periodontosis and dental caries in the parents are among the probable causes of injury to the germ plasm.

Certain dietary faults are found constantly in cases of periodontosis and dental caries. Frequently these diseases are active simultaneously. A calcium-phosphorus ratio of 1 to 1.5, and an acid-base ratio of 1 to 3 is desirable. In cases of active periodontosis, the important diagnostic factor is an excess of phosphorus, although usually the acid-base ratio is also unfavorable. In patients with active dental caries, there is a marked deviation toward parity from the optimum acid-base ratio, because of a large proportion of refined grain and sugar products in the diet. The calcium-phosphorus ratio frequently is correct.

Occasionally a distinct acid-base imbalance exists in patients on a high protein, high fat diet with no refined carbohydrates. These patients do not have active dental caries, but there may be disturbances of articulation or loosening of the teeth.

Inclusion of refined grain and sugar products in the diet beyond the tolerance of the patient appears to be the chief causative factor in dental caries and periodontosis. For the prevention and control of dental disease, a diet of 2,000 calories daily may not be diluted safely with refined grain and sugar products. As the total caloric intake increases, the inclusion of 5 to 10 per cent of these products may have no harmful effect.—*James Springer.*

Further Observations on Dental Defects in Infants Subsequent to Maternal Rubella During Pregnancy. M. W. Evans. M. J. Australia 1: 780, June 28, 1947.

Of 67 children born to mothers who had rubella during pregnancy, 30 exhibited congenital dental abnormalities, in 20 cases major in degree. Caries was disregarded in this calculation. If caries and restricted arch formation are taken into account, the abnormalities are detectable in 46 of the children. With the exception of 5, the remainder of the infants show other congenital malformation. The main abnormalities occurred in the children of mothers who had contracted rubella during the first three months of pregnancy; in the "later pregnancy" group the abnormalities were few in number and minor in degree. The main dental abnormalities comprised retardation of eruption, dental caries and hypoplasia of enamel. Three cases of congenital absence of isolated deciduous teeth and 4 of premature eruption of permanent teeth are recorded.—*J.A.M.A. 135:539, October 25, 1947.*

LIST OF DENTAL OFFICERS

SEPARATED FROM NAVY DENTAL CORPS

THE following naval dental officers have been separated from service, according to lists received from the Navy Department. These lists are not complete. Other names will be published as soon as possible.

Alabama

Birmingham	Brady, Ralph F.	Lieut.
Courtland	Reding, Curtis C.	Lieut.
Jasper	Rice, Orland L.	Lieut.

Arizona

Globe	Watrous, Ansel	Lieut.
Tucson	Felix, Robert L.	Lieut.

California

Aden	Nelson, Wayne A.	Lieut.
Alvarado	Wasley, James C., Jr.	Lieut.
Los Angeles	Hambleton, Richard S.	Lieut.
Los Angeles	Sutphin, Nighbert W.	Lt. Cmdr.
Paso Robles	Mallory, Everette J.	Lieut.
Reedley	Coale, Howard O., Jr.	Lieut.
Reedley	Hallock, Douglas F.	Lieut.
San Diego	Bachman, Virgin Y.	Lt. Cmdr.
San Francisco	Schimmel, William J.	Lieut.
San Francisco	Yules, Alvan A.	Lieut.
South Gate	Ingwersen, William F.	Lieut.
Willows	Ward, John T.	Lieut.

Delaware

Seaford	Moore, Charles F.	Lieut.

Florida

Miami	Erickson, Hilmer A.	Cmdr.
Tampa	Wadsworth, Kenneth C.	Lieut.

Hawaii

Honolulu	Burso, Alexis A.	Lieut.

Idaho

Boise	Hanford, David W.	Lieut.
Wallace	Reilly, John J.	Lieut.

Illinois

Chicago	Claus, Alvin H.	Lieut.
Chicago	Deorio, Clement J.	Lieut.
Chicago	Engelmann, Reid O.	Lieut.
Chicago	Garfin, Frank	Lieut.
Chicago	Gerstein, Harold	Lieut.
Chicago	Gold, Jerome J.	Lieut.
Chicago	LaVere, Arthur M.	Lieut.
Chicago	Lebetski, Raymond R.	Lieut.
Chicago	Malmberg, Bertel T.	Lieut.
Chicago	Okmin, Seymour	Lieut.
Chicago	Pacocha, Theodore J.	Lieut.
Chicago	Pape, Thomas J.	Lieut.
Chicago	Petraitis, Benedict J.	Lieut.
Chicago	Ray, Ralph M.	Lieut.
Chicago	Sandquist, Robert W.	Lieut.
Chicago	Scavuzzo, Santo F.	Lieut.
Chicago	Sherow, Asher	Lieut.
Chicago	Shulruff, Walter	Lieut.
Chicago	Smith, Edward A.	Lieut.
Chicago	Smith, Joseph B.	Lieut.
Chicago	Sudakoff, Carl H.	Lieut.
Chicago	Torch, David	Lieut.
Chicago	Warzak, Bernard J.	Lieut.
Chicago	Zak, Herbert B.	Lieut.
Evanston	Davy, Oakley B.	Lieut.
Moline	Watkins, Dan H.	Lieut.
Neponset	Curran, Warren J.	Lieut.

Indiana

Indianapolis	Stenger, John M.	Lieut.
Indianapolis	Witt, William W.	Lieut.

Iowa

Danbury	Durst, Mark A.	Lieut
Fairfield	Carter, Lewis B.	Lieut.

Louisiana

Boyce	James, Billy G.	Lieut.
Chestnut	Cloud, Sun R.	Lieut.

Massachusetts

Dedham	Welch, William F.	Cmdr.
Norwood	Berezin, Norman L.	Lieut.
Peabody	Mizner, Sidney S.	Lieut.
Quincy	Whin, Woodrow W.	Lieut.

Michigan

Adrian	Colbath, Norman O.	Lieut.
Detroit	Super, John W.	Lieut.
Detroit	Weber, John L.	Lieut.
Grand Rapids	DeHaan, Clarence J.	Lieut.

Minnesota

Belle Plaine	Carlson, Theodore E.	Lieut.
Brainerd	Bendickson, Marvin S.	Lieut.
Grand Meadow	Burrington, Spencer W.	Lieut.
Kelly Lake	Bartlett, George W.	Lieut.
Minneapolis	Ennen, Joseph A.	Lieut.
Minneapolis	Hageman, Bernard	Lt. Cmdr.
Minneapolis	Oemcke, Robert H.	Lieut.
Minneapolis	Peterson, William A.	Lieut.
Minneapolis	Rachie, George L.	Lieut.
Minneapolis	Sigford, Robert Q.	Lieut.
Minneapolis	Zustiak, Michael	Lieut.

Nashwauk	Weber, John E.	Lieut.
St. Paul	Anderson, Gordon P.	Lieut.
St. Paul	Baker, Robert E.	Lieut.
St. Paul	Koch, John A.	Lieut.
Stewartville	Dayton, Charles A.	Lieut.
Mississippi		
Coffeeville	Criss, William T.	Lieut.
Gulfport	Reel, Anton, Jr.	Lieut.
University	Tedder, Hugh W.	Lieut.
Missouri		
Belle	Tellman, John P.	Lieut.
Nebraska		
Lincoln	Morrow, Neale H.	Lieut.
St. Louis	Mitchell, James A.	Lieut.
Scottsbluff	Steen, William W.	Lieut.
Springview	McCoy, Chester S.	Lieut.
New Hampshire		
Portsmouth	Smith, Norman L.	Lieut.
New Mexico		
Albuquerque	Simms, David E.	Lieut.
New Jersey		
Newark	Solomon, Samuel A.	Lieut.
New York		
Brooklyn	Cash, Lawrence H.	Lieut.
Brooklyn	Feinstone, Theodore	Lieut
Brooklyn	Fenster, Samuel	Lieut.
Brooklyn	Fontana, Joseph B.	Lieut.
Brooklyn	Lite, Theodore	Lieut.
Brooklyn	Mitchell, Joseph J.	Lieut.
Brooklyn	Sobelson, Jerome	Lieut.
Brooklyn	Zimmer, Samuel	Lieut.
Great Neck	Smirnow, Robert	Lieut.
Long Island City	DeRosa, Gerald G.	Lieut.
New York	Kuhn, Lawrence M.	Lieut.
Richmond Hill	Haberman, Jules	Lieut.
Schenectady	Parisi, Frank P.	Lieut.
Yonkers	Polidoro, Peter L.	Lieut.
North Carolina		
Belhaven	Harris, Guy V.	Cmdr.
North Dakota		
Grand Forks	Rovelstad, Homer D.	Lieut.
Ohio		
Bridgeport	Green, Harold R.	Lieut.
Oklahoma		
Hollis	Phipps, Charles E.	Lieut.
Oregon		
Portland	Derrig, Edgar H.	Lieut.
Pennsylvania		
Allentown	Gilbert, Robert H.	Lieut.
Butler	Hughes, William J.	Lieut.
Connellsville	O'Donovan, Eugene J.	Lieut.
Millvale	Zwicker, Hollis W.	Lieut.
Mount Lebanon	Powell, Watson O.	Lieut.
Patton	Overberger, Robert E.	Lieut.
Philadelphia	Martin, Graham E.	Lieut.
Pittsburgh	Schmidt, Paul H.	Lieut.
Ridgeway	Davido, Richard A.	Lieut.
Rockingham	Bittner, Jay R.	Lieut.
Wilkinsburg	Mandel, Isadore B.	Lieut.
Puerto Rico		
Nayaguan	Benavent, Arturo J.	Lieut.
Tennessee		
Lewisburg	Hopper, Charles T.	Lieut.
Texas		
Amarillo	Wegener, Hubert J.	Lieut.
Brownwood	Craig, Berkley G., Jr.	Lieut.
Canyon	Gerald, Thomas S., Jr.	Lieut.
Canyon	Wooten, W. J., Jr.	Lieut.
Corpus Christi	Allen, William M.	Lieut.
Corpus Christi	Barnard, Cornell C.	Lieut.
Dallas	Blanton, Everett B., Jr.	Lieut.
Dallas	Curry, Billy J.	Lieut.
Dallas	Lipscomb, Thomas A.	Lieut.
Dallas	Martin, Marion M.	Lieut.
Dallas	Mosteller, John H.	Lieut.
Dallas	Simmons, James H.	Lieut.
Dallas	Sutherland, John P., Jr.	Lieut.
Denton	Taylor, Louis E.	Lieut.
Fort Worth	Tomme, John D.	Lieut.
Fort Worth	Wilson, John C.	Lieut.
Houston	Avery, Frank L.	Lieut.
Houston	Blonstein, Maurice L.	Lieut.
Houston	Hichens, Hedley C.	Lieut.
Houston	Lowrie, Robert J.	Lieut.
Houston	McMahon, Jack R.	Lieut.
Longview	Terrell, William R.	Lieut.
Longview	Thomas, A. G.	Lieut.
Marshall	DeBre, Alvin J.	Lieut.
Marshall	Feltman, Harry H., Jr.	Lieut.
Pasadena	Foster, James K., Jr.	Lieut.
Sherman	Casten, Pete G.	Lieut.
Waco	Long, William B.	Lieut.
Wichita Falls	Parker, William S.	Lieut.
Utah		
Ogden	Williams, John R.	Lieut.
Salt Lake City	Brox, Ted M.	Lieut.
Tooele	Wassom, Robert E.	Lieut.
Washington		
Camas	Meyer, Charles F.	Lieut.
Tacoma	Taylor, William R.	Lieut.
West Virginia		
Fairmont	McCray, Richard E., Jr.	Lieut.
Wheeling	Carenbauer, Frank L.	Lieut.
Wisconsin		
Eleva	Alley, John G.	Lieut.
Jefferson	Moen, Donald N.	Lieut.
Sheboygan	Heimlich, Robert W.	Lieut.
Wyoming		
Wheatland	Wilson, Robert L.	Lieut.

DEATHS

Adams, W. R., Southington, Conn.; died November 15; aged 73.

Allen, A. B., Pasadena, Calif.; College of Dentistry, University of Minnesota, 1902; died in January; aged 68.

Allen, Seymour E., Chicago; College of Dentistry, Ohio Medical University, 1901; died January 8; aged 80.

Anderson, T. A., Corpus Christi, Texas; died November 21; aged 75.

Bailey, L. G., Lansing, Mich.; College of Dental Surgery, University of Michigan, 1909; died October 6.

Baker, James B., Madison, Wis.; Chicago College of Dental Surgery, 1897; died January 7; aged 71.

Batson, B. F., Grayville, Ill.; died December 20; aged 76.

Baxter, George W., Bloomfield, N. J.; died January 25; aged 87.

Beland, R. L., Oakland, Calif.; Kansas City Dental College, 1913; died December 15; aged 66.

Bicknell, Omar J., Washington, Ind.; Indiana Dental College, 1904; died December 30; aged 63.

Boudreaux, William J., New Orleans; died December 14; aged 57.

Brazier, R. Horace, New York; died December 9.

Breyer, P. M., Freeport, Ill.; College of Dentistry, University of Illinois, 1909; died December 19; aged 61.

Brush, Forest G., Zionsville, Ind.; Indiana Dental College, 1901; died January 19; aged 70.

Brys, Fred J., St. Louis; School of Dentistry, St. Louis University, 1929; died December 26; aged 43.

Cahill, James S., Richmond, Va.; Virginia School of Dentistry of Medical College of Virginia, 1903; died January 15.

Carman, George F., Salt Lake City; New Orleans College of Dentistry, 1907; died January 3; aged 61.

Carpenter, Charles H., Indianapolis; Indiana Dental College, 1910; died December 16; aged 69.

Cavanagh, Charles J., Philadelphia; died in December.

Chamberlain, George A., Grand Rapids, Mich.; died December 25; aged 72.

Cohen, James, Philadelphia; School of Dentistry, Temple University, 1923; died December 3; aged 49.

Cole, C. L., Alexandria, Minn.; died December 11; aged 68.

Cooper, Eugene M., Mt. Eden, Calif.; died October 27; aged 88.

Coulson, William E., Edgewood, Pa.; School of Dentistry, University of Pittsburgh, 1913; died January 2.

Crawford, Archibald J., Martins Ferry, Ohio; Ohio College of Dental Surgery, University of Cincinnati, 1900; died January 3; aged 74.

Crostic, George A., Detroit; Department of Dental Surgery, Detroit College of Medicine, 1908; died January 3; aged 68.

Curtiss, Myron E., Bradenton, Fla.; died December 21; aged 75.

Davis, Claude M., Akron, Ohio; School of Dentistry, University of Pittsburgh, 1903; died December 22; aged 67.

Davis, W. E., Mulvane, Kans.; died December 22; aged 72.

Dicus, John B., Oak Park, Ill.; College of Dental Surgery, 1891; died January 20; aged 78.

Dill, Roger L., Robinson, Ill.; Indiana Dental College, 1917; died January 3; aged 54.

Eckert, Lawrence R., Pittsburgh; School of Dentistry, University of Pittsburgh, 1925; died January 10; aged 44.

Ehni, Robert E., Springfield, Mass.; Thomas W. Evans Museum and Dental Institute School of Dentistry, University of Pennsylvania, 1885; died January 7; aged 87.

Elliot, George W., Riverview, R. I.; died December 11; aged 81.

Elsacer, William C., Whittier, Calif.; College of Dental Surgery, University of Michigan, 1906; died December 29.

Evans, Harry P., New York; New York College of Dentistry, 1906; died January 5; aged 63.

Farrell, D. L., Tulsa, Okla.; died January 10; aged 71.

Fox, Frank A., Philadelphia; School of Dentistry, University of Pennsylvania, 1901; died January 11; aged 67.

Gardner, Paul L., Jackson, Mich.; College of Dental Surgery, University of Michigan, 1912; died October 22; aged 64.

Garvey, Joseph, Sidney, Iowa; died November 30; aged 28.

George, Charles C., Logansport, Ind.; died January 8; aged 78.

Gibbons, Jerry B., Flushing, Mich.; died December 15; aged 71.

Goldstein, Max A., Lakewood, N. J.; College of Dentistry, New York University, 1914; died December 29; aged 54.

Gould, Louis, Chelsea, Mass.; Dental School, Harvard University, 1919; died December 21; aged 50.

Grant, Harry, Chicago; died January 3; aged 84.

Gregg, Chandler C., Rittman, Ohio; College of Dentistry, Ohio State University, 1915; died December 22; aged 63.

Haas, Alfred M., Philadelphia; Philadelphia Dental College, 1906; died December 20; aged 71.

Hagan, Jonathan R., Washington, D. C.; Dental Department, Columbian University, 1891; died January 23; aged 86.

Hair, I. M., Atlanta, Ga.; Atlanta Dental College, 1898; died October 24.

Hall, Robert T., Fresno, Calif.; Philadelphia Dental College, 1899; died December 31; aged 77.

Hamilton, Thomas J., Akron, Ohio; died January 8; aged 76.

Harding, Frank, Richmond, Ind.; Ohio College of Dental Surgery, Dental Department of the University of Cincinnati, 1896; died January 13; aged 76.

Harris, Madison C., Eugene, Ore.; Dental School, Northwestern University, 1904; died November 23; aged 70.

Harris, Warren B., Tulsa, Okla.; Ohio College of Dental Surgery, University of Cincinnati, 1897; died December 19; aged 74.

Harsch, Benjamin T., Peoria, Ill.; Dental School, Northwestern University, 1904; died December 7; aged 71.

Herbert, Jesse E., Middletown, Va.; died November 13; aged 72.

Hewetson, Albert D., Bellevue, Ky.; Ohio College of Dental Surgery, University of Cincinnati, 1914; died January 7; aged 65.

Hirsch, Aaron J., Plainfield, N. J.; Baltimore College of Dental Surgery of the University of Maryland, 1919; died January 14; aged 51.

Hodge, George R., Kansas City, Mo.; Western Dental College, 1910; died January 3.

Houchins, P. W., Welch, W. Va.; Ohio College of Dental Surgery, Dental Department of the University of Cincinnati, 1915; died December 27; aged 60.

Karr, Guy A., Ottawa, Ill.; Chicago College of Dental Surgery, 1914; died December 31; aged 60.

Langan, Harold P., Olyphant, Pa.; School of Dentistry and the Baltimore College of Dental Surgery, University of Maryland, 1924; died November 28.

Love, Joseph B., Martin, Tenn.; died December 14; aged 79.

Maycock, John F., Wilkes Barre, Pa.; Dental Department, Baltimore Medical College, 1899; died December 11.

Miller, Herbert C., Portland, Ore.; Missouri Dental College, 1885; died December 20; aged 83.

Murphy, Raymond N., Sebastopol, Calif.; College of Dentistry, University of California, 1902; died October 20; aged 67.

Peterson, Johan F., Minneapolis; died January 18; aged 66.

Taft, Roger B., Belmont, Mass.; Harvard University Dental School, 1908; died December 28; aged 60.

Wallace, Lew E., San Francisco; Dental Department, College of Physicians and Surgeons, 1904; died December 28; aged 67.

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ANNOUNCEMENTS

MEETINGS OF STATE SOCIETIES

State	Date	Place	Secretary	Address
Alabama	April 15-17	Birmingham	G. W. Matthews	1922 Tenth Ave., S., Birmingham 5
Arizona	April 22-24	Phoenix	B. K. Litt	68 E. Congress, Tucson
Arkansas	May 2-5	Little Rock	D. M. Hamm	Clarksville
California	April 26-28	San Francisco	L. E. Linehan	450 Sutter St., San Francisco
S. California	March 29-31	Los Angeles	M. E. Ralston	903 Crenshaw Bldg., Los Angeles 6
Colorado	June 14-16	Glenwood Springs	R. A. Downs	724 Republic Bldg., Denver 2
Connecticut	May 19-21	Hartford	E. S. Arnold	37 Linnard Rd., W. Hartford
Delaware			J. Krygier	309 S. State St., Dover
D. of Columbia	March 14-18	Washington	K. H. Wood	202-1835 Eye St., N. W., Washington
Florida	Dec. 12-15	Hollywood	J. I. Todd	433 St. James Bldg., Jacksonville
Georgia	Oct. 13-15	Augusta	J. M. Heard, Jr.	Persons Bldg., Macon
Hawaii	Oct. 28-31	Lihue	J. H. Dawe	P. O. Box 39, Honolulu 10
Idaho			R. Sutcliff	Twin Falls
Illinois	May 20-22	Springfield	P. W. Clopper	623 Jefferson Bldg., Peoria 2
Indiana	May 17-19	Indianapolis	L. E. Ewbank	Kingman
Iowa	May 3-5	Des Moines	A. N. Humiston	417 Higley Bldg., Cedar Rapids
Kansas	May 2-5	Wichita	F. A. Richmond	1008 Huron Bldg., Kansas City
Kentucky	April 5-7	Louisville	J. L. Walker	640 Barbee Way, S., Louisville
Louisiana	April 8-10	Alexandria	J. S. Bernhard	407 Medical Arts Bldg., Shreveport
Maine	June 6-8	Portland Springs	P. W. Anderson	32 Deering St., Portland
Maryland	May 3-5	Baltimore	J. H. Shackelford	706 Baltimore Life Bldg., Baltimore 1
Massachusetts	May 3-6	Boston	P. E. Adams	227 Commonwealth Ave., Boston 16
Michigan	April 12-14	Detroit	F. Wertheimer	Michigan Department of Health, Lansing
Minnesota			C. V. E. Cassel	Lowry Medical Arts Bldg., St. Paul
Mississippi	May 31-June 2	Biloxi	F. C. Sneed	Osyka
Missouri	April 25-28	Jefferson City	C. W. Digges	Exchange National Bank Bldg., Columbia
Montana	May 6-8	Great Falls	C. S. Renouard	305 Phoenix Bldg., Butte
Nebraska	May 10-12	Omaha	F. A. Pierson	Federal Securities Bldg., Lincoln
Nevada			L. G. Jacob	505 Chestnut St., Reno
New Hampshire	June 27-29	Jefferson	F. E. Williams	814 Elm St., Manchester
New Jersey	April 20-23	Atlantic City	J. G. Carr	407 Cooper St., Camden
New Mexico	May 24-26	Santa Fe	J. S. Eilar	First National Bank Bldg., Albuquerque
New York	May 10-13	Syracuse	C. A. Wilkie	1 Hanson Place, Brooklyn
North Carolina	April 26-28	Asheville	R. F. Hunt	Rocky Mount
North Dakota	May 9-12	Minot	A. L. Smeby	Northwood
Ohio	Nov. 7-10	Columbus	E. G. Jones	185 E. State St., Columbus
Oklahoma	April 11-14	Tulsa	E. W. Wise	Medical Arts Bldg., Tulsa
Oregon			W. H. Hurley	407 Selling Bldg., Portland 5
Panama Canal Zone			T. W. Cagle	Box 243, Cocoli
Pennsylvania	May 11-13	Atlantic City, N.J.	E. R. Aston	421 Market St., Kingston
Philippine I.			G. A. Carreon	9 Broadway, Third St., N. Manila
Puerto Rico			R. Miranda	Box 747, Rio Piedras
Rhode Island			S. Ozarin	172 Thames St., Newport
South Carolina	May 2-4	Greenville	J. R. Owings	201 E. North St., Greenville
South Dakota	May 9-11	Sioux Falls	E. W. Elmen	Sioux Falls
Tennessee	May 24-27	Memphis	E. J. Justis	Exchange Bldg., Memphis
Texas	April 12-15	Fort Worth	W. Ogle	313 Medical Arts Bldg., Dallas
Utah			S. Ballinger	1001 Tribune-Telegram Bldg., Salt Lake City
Vermont	May 23-25	Woodstock	J. A. Larrow	Middlebury
Virginia	April 12-14	Richmond	J. E. John	804 Medical Arts Bldg., Roanoke
Washington			F. J. Dingler	1502 Medical & Dental Bldg., Seattle 1
West Virginia	May 20-22	Clarksburg	C. J. Gavelda	Clarksburg
Wisconsin	March 30-April 1	Milwaukee	R. A. Mason	964 N. 27th St., Milwaukee
Wyoming			J. D. McNiff	208 Grand Ave., Laramie

MEETINGS OF STATE BOARDS OF DENTAL EXAMINERS

State	Date	Place	Secretary	Address
Arizona	March 31-April 3	Phoenix	R. K. Trueblood	25 N. Second Ave., Glendale
Arkansas	June 21-24	Little Rock	H. E. Hanna	National Bank of Commerce Bldg., El Dorado
California	June 14 July 26	Los Angeles San Francisco	K. I. Nesbitt	Room 203, 515 Van Ness Ave., San Francisco 2
Colorado	June 21-25	Denver	E. G. Netherton	724 Republic Bldg., Denver 2
Florida	June 28-30 July 1-3	Jacksonville	A. W. Kellner	P. O. Box 155, Hollywood
Indiana	June 14-17	Indianapolis	C. A. Frech	Gary National Bank Bldg., Gary
Iowa	March 8-12	Iowa City	W. L. Bierring	Department of Health Des Moines
Mississippi	June 15		M. B. Pearce	New Albany
Nevada	May 10-11	Las Vegas	L. G. Jacob	505 Chestnut St., Reno
North Carolina	June 28-July 1	Raleigh	F. O. Alford	1109 Liberty Life Bldg., Charlotte 2
Ohio	March 22-27 June 28-July 3*	Columbus Cleveland	E. D. Lowry	79 E. State St., Columbus
Pennsylvania	June 10-12 June 14-16	Philadelphia Pittsburgh	R. E. V. Miller	Northampton National Bank Bldg., Easton
South Carolina	June 24-27		E. G. Bumgardner	1517 Hampton St., Columbia 29
Tennessee	June 7-11	Memphis	J. J. Vaughn	1005-6 Medical Arts Bldg., Nashville
Virginia	June 15	Richmond	J. M. Hughes	715 Medical Arts Bldg., Richmond 19
West Virginia	June 21-24		R. H. Davis	510-16 Goff Bldg., Clarksburg
Wyoming	June 24	Rock Springs	W. J Ryan	1720 Carey Ave., Cheyenne

*Dental and dental hygiene examination.

OTHER MEETINGS

Name	Date	City	Secy. or Chm.	Address
Alumni Association of the Chicago College of Dental Surgery, Loyola University	April 12, 13	Chicago	W. Wellman	1757 W. Harrison St., Chicago
American Association of Dental Schools	June 21-23	Buffalo	J. E. Buhler	School of Dentistry, Temple University, Philadelphia 40
American Association of Orthodontists	April 27-29	Columbus	M. E. Ernst Secy.	1250 Lowry Medical Arts Bldg., St. Paul
American Board of Orthodontics	April 23-26	Columbus	B. G. deVries Secy.	705 Medical Arts Bldg., Minneapolis 2
American Dental Association, Eighty-Ninth Annual Meeting	Sept. 13-17	Chicago	H. Hillenbrand Secy.	222 E. Superior St., Chicago 11
American Dental Society of Europe	July 27-30	London	K. C. Campbell Secy.	88 Portland Place, London, W. 1
American Society for the Advancement of General Anesthesia in Dentistry	March 22	New York	M. H. Feldman Secy.	730 Fifth Ave., New York

Name	Date	City	Secy. or Chm.	Address
Canadian Dental Association	June 21-24	Murray Bay, P. Q.	G. Ratte	140 St. John St., Quebec City, P. Q.
Cincinnati Dental Society March Clinic Meeting and Children's Dental Health Day	March 14-16	Cincinnati	R. L. Hollo	Doctors Bldg., Cincinnati 2
Cleveland Dental Society, Annual Spring Clinic Meeting	May 3-5	Cleveland	P. J. Warren Pub. Chm.	14805 Detroit Ave., Cleveland 15
National Board of Dental Examiners	April 12-13†		G. L. Teall Secy.	Box 71, Hiawatha, Kan.
Northeastern Society of Orthodontists	March 1-2	Atlantic City N. J.	O. Jacobson Secy.	35 W. 81st St., New York
Northwest Conference in Dental Medicine	April 25-30	Sun Valley	A. A. Litscher Secy.	1064 Paulsen M & D Bldg., Spokane
Ontario Dental Association Convention Eighty-First Annual Meeting	May 17-19	Toronto	D. Jutton Secy.	86 Bloor St., West, Toronto
Seventh Pacific Coast Conference	June 7-10	Salt Lake City	L. O. Halgren	First National Bank Bldg., Salt Lake City
Thomas P. Hinman Mid-Winter Clinic	March 21-23	Atlanta, Ga.	F. A. Daniel Gen. Chm.	1023 Doctors Bldg., Atlanta 3, Ga.
University of Louisville Dental Alumni			M. S. Kirschner	128 Deer Park Ave., Babylon, L. I., N. Y.
Washington University Dental Alumni Eighty-Second Annual Meeting	March 5-6	St. Louis	V. P. Thompson Secy.	234 W. Lockwood, Webster Groves 19, Mo.

†Examinations will be held in schools where there are five or more candidates.